

*Draft - November 2002*

**DRAFT ECONOMIC ANALYSIS  
OF  
PROPOSED CRITICAL HABITAT DESIGNATION  
FOR THE KAUA'I CAVE WOLF SPIDER  
AND  
THE KAUA'I CAVE AMPHIPOD  
ISLAND OF KAUA'I, HAWAII**

**November 2002**

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## TABLE OF CONTENTS

<b>PREFACE</b> .....	<b>P-1</b>
<b>FORWARD</b> .....	<b>F-1</b>
<b>EXECUTIVE SUMMARY</b> .....	<b>ES-1</b>
<b>I. THE CAVE ANIMALS AND PROPOSED CRITICAL HABITAT</b> .....	<b>I-1</b>
1. The Cave Animals .....	1
2. Proposed Critical Habitat .....	2
3. <i>Primary Constituent Elements</i> .....	2
4. Excluded Areas, Features and Structures .....	3
5. Underground Features .....	4
6. Distribution of the Cave Animals .....	6
7. Threats to the Cave Animals .....	7
8. Conservation and Recovery .....	8
9. Surface and Other Features .....	9
<b>II. PHYSICAL AND SOCIOECONOMIC PROFILES OF KAUA'I COUNTY AND THE KOLOA DISTRICT</b> .....	<b>II-1</b>
1. Physical Descriptions .....	1
2. Socioeconomic Profiles .....	2
3. Outlook for Growth and Socioeconomic Change .....	6
<b>III. THE ENDANGERED SPECIES ACT</b> .....	<b>III-1</b>
1. Role of Species Listing and Critical Habitat Designation in Protecting Threatened and Endangered Species .....	1
2. Consultation Under Section 7 of the Act .....	2
3. Taking and Other Restrictions of the Act .....	4
<b>IV. EXISTING PROTECTIONS</b> .....	<b>IV-1</b>
1. Federal Species Protections and Land Management .....	1
2. State Land Management .....	4
3. State Species Protections .....	8
4. County Land Management .....	9

<b>V.</b>	<b>APPROACH TO THE ECONOMIC IMPACT ANALYSIS</b>	<b>V-1</b>
1.	Scope of the Analysis	1
2.	Analytical Concepts and Steps	2
3.	Sources of Information	5
<b>VI.</b>	<b>ECONOMIC COSTS AND BENEFITS</b>	<b>VI-1</b>
1.	Introduction	1
2.	History and Typical Costs of Section 7 Consultations	2
3.	Direct Section 7-related Costs	10
4.	Indirect Costs	49
5.	Costs to Small Entities	77
6.	Benefits	82
7.	Summary of Economic Impacts	88
	<b>REFERENCES</b>	<b>R-1</b>

## FIGURES

<b><u>Figure</u></b>	<b><u>Page</u></b>
ES-1 Proposed Critical Habitat Units .....	ES-5
II-1 Island of Kaua'i .....	II-12
II-2 Koloa-Poi'pu-Kalaheo Planning District .....	II-14

## TABLES

<b><u>Table</u></b>	<b><u>Page</u></b>
ES-1 Section 7 Costs and Benefits Attributable to the Cave Animals Listing and Critical Habitat .....	ES- 6
I-1 Information on the Proposed Critical Habitat for the Cave Animals .....	I- 12
II-1 Socioeconomic Profile, County of Kaua'i .....	II- 13
VI-1 Estimated Cost of a Section 7 Consultation and Biological Survey .....	VI -4
VI-2 New Road Construction Project Modification Costs .....	VI-91
VI-3 Projected 2020 Development, with and without Cave-Animal Listing and Critical Habitat Designation .....	VI-92
VI-4 Island-Wide Economic and Demographic Impacts of Cave Animal Listing and Critical Habitat Designation .....	VI -93
VI-5 Section 7 Costs and Benefits Attributable to the Cave Animals Listing and Critical Habitat .....	VI-96

## PREFACE

The U.S. Fish and Wildlife Service has added this preface to all economic analyses of critical habitat designations:

"The standard best practice in economic analysis is applying an approach that measures costs, benefits, and other impacts arising from a regulatory action against a baseline scenario of the world without the regulation. Guidelines on economic analysis, developed in accordance with the recommendations set forth in Executive Order 12866 ("Regulatory Planning and Review"), for both the Office of Management and Budget and the Department of the Interior, note the appropriateness of the approach:

*'The baseline is the state of the world that would exist without the proposed action. All costs and benefits that are included in the analysis should be incremental with respect to this baseline.'*

"When viewed in this way the economic impacts of critical habitat designation involve evaluating the 'without critical habitat' baseline versus the 'with critical habitat' scenario. Impacts of a designation equal the difference, or the increment, between these two scenarios. Measured differences between the baseline and the scenario in which critical habitat is designated may include (but are not limited to) changes in land use, environmental quality, property values, or time and effort expended on consultations and other activities by Federal landowners, Federal action agencies, and in some instances, State and local governments and/or private third parties. Incremental changes may be either positive (benefits) or negative (costs).

"In *New Mexico Cattle Growers Ass'n v. U.S.F.W.S.*, 248 F.3d 1277 (10<sup>th</sup> Cir. 2001), however, the 10th Circuit recently held that the baseline approach to economic analysis of critical habitat designations that was used by the Service for the southwestern willow flycatcher designation was 'not in accord with the language or intent of the ESA.' In particular, the court was concerned that the Service had failed to analyze any economic impact that would result from the designation, because it took the position in the economic analysis that there was no economic impact from critical habitat that was incremental to, rather than merely co-extensive with, the economic impact of listing the species. The Service had therefore assigned all of the possible impacts of designation to the listing of the species, without acknowledging any uncertainty in this conclusion or considering such potential impacts as transaction costs, reinitiations, or indirect costs. The court rejected the baseline approach incorporated in that designation, concluding that, by obviating the need to perform any analysis of economic impacts, such an approach rendered the economic analysis requirement meaningless: 'The statutory language is plain in requiring some kind of consideration of economic impact in the CHD phase.'

"In this analysis, the Service addresses the 10th Circuit's concern that we give meaning to the ESA's requirement of considering the economic impacts of designation by acknowledging the uncertainty of assigning certain post-designation economic impacts (particularly section 7 consultations) as having resulted from either the listing or the designation. The Service believes that for many species the designation of critical habitat has a relatively small economic impact, particularly in areas where consultations have been ongoing with respect to the species. This is because the majority of the consultations and associated project modifications, if any, already consider habitat impacts and as a result, the process is not likely to change due to the designation of critical habitat. Nevertheless, we recognize that the nationwide history of consultations on critical habitat is not broad, and, in any particular case, there may be considerable uncertainty whether an impact is due to the critical habitat designation or the listing alone. We also understand that the public wants to know more about the kinds of costs consultations impose and frequently believe that designation could require additional project modifications.

"Therefore, this analysis analyzes the impacts of critical habitat designation that may be 'attributable co-extensively' to the listing of the species. Because of the potential uncertainty about the benefits and economic costs resulting from critical habitat designations, we believe it is reasonable to estimate the effects of the designation utilizing this approach to avoid understating potential economic effects. It is important to note that the inclusion of impacts attributable co-extensively to the listing does not convert the economic analysis into a tool to be considered in the context of a listing decision. As the court reaffirmed in the southwestern willow flycatcher decision, 'the ESA clearly bars economic considerations from having a seat at the table when the listing determination is being made.'

DATED: October 22, 2002

## FORWARD

### 1. CONTENT AND PURPOSE

This report assesses the economic impacts that may result from the designation of critical habitat for the endangered Kaua'i cave wolf spider (*Adelocosa anops*) and the endangered Kaua'i cave amphipod (*Spelaeorchestia koloana*) ("cave animals") on the island of Kaua'i in the State of Hawai'i. It was prepared for the U.S. Fish and Wildlife Service (the Service) to help them in their decision regarding designating critical habitat for the cave animals.

As required by the Endangered Species Act, as amended (the Act), the decision to designate a particular area as critical habitat must take into account the potential economic impact of the critical habitat designation. If the economic analysis reveals that the economic impacts of designating any area as critical habitat outweigh the benefits of designation, then the Service may exclude the area from consideration, unless excluding the area will result in the extinction of the species.

The focus of the economic analysis is on section 7(a)(2) of the Act which requires consultation with the Service and possible project modification for certain projects and activities that may affect a species listed as threatened or endangered, or the habitat of a listed species. The consultations and possible project modifications will have economic impacts which, in this report, are referred to as "section 7 economic impacts" to distinguish them from the economic impacts related to other sections of the Act. Other sections of the Act are outside the scope of this economic analysis.

### 2. ORGANIZATION

This report is organized into six chapters:

— Chapter I: The Cave Animals and Proposed Critical Habitat

This chapter provides relevant information on the cave animals and the proposed critical habitat units.

— Chapter II: Physical and Socioeconomic Profiles of Kaua'i County and the Koloa District

To provide the context for evaluating the economic impacts of the proposed critical habitat designation, this chapter presents physical descriptions, socioeconomic profiles, and the outlooks for growth for Kaua'i County and the District of Koloa.



— Chapter III: The Endangered Species Act

Relevant information from the Act is presented in Chapter III, including the role of critical habitat designation in protecting threatened and endangered species, requirements for consulting with the Service, and the definition of taking and other restrictions.

— Chapter IV: Existing Protections

This chapter presents relevant information on existing regulations and land management policies that protect wildlife species or their habitats.

— Chapter V: Approach to the Economic Impact Analysis

This chapter gives the general approach used to estimate section 7 economic impacts and indirect economic impacts of the species listing and the critical habitat designation.

— Chapter VI: Economic Costs and Benefits

This chapter discusses planned projects, activities and land uses in the proposed critical habitat units. It also estimates direct and indirect economic costs and benefits, and identifies the effects that can be attributed solely to the critical-habitat provisions of section 7.

After learning about the proposed critical habitat (Chapter I), readers who are already familiar with Kaua'i County and the Koloa District (Chapter II), the Act (Chapter III), existing protections (Chapter IV), or the approach to conducting the economic analysis (Chapter V) may wish to skip these chapters, as appropriate, and proceed to the analysis of economic impacts (Chapter VI).

### **3. TERMINOLOGY**

The following Service terminology is *italicized* throughout this document for the benefit of readers who are unfamiliar with it and want to be reminded that the Service has given specific meanings to these words and terms: *Federal involvement*, *Federal nexus*, *occupied*, *unoccupied*, *primary constituent elements*, *jeopardy*, *adverse modification*, and *take*. The terms are explained in the body of the report.

#### **4. MAPPING ACCURACY**

Acreage estimates presented in Table I-1 and used in the text are based on digitized maps and acreage calculations provided by the Service. The data files for these maps were generated by the Service, other Federal agencies, State and county agencies, and private contractors. For the most part, the digitized maps are reasonably accurate at a scale of 1:24,000. Nevertheless, they are not exact: the mapped locations of certain features (borders, roads, structures, etc.) sometimes deviate from their actual locations; maps from different sources may differ as to the locations of certain features; mapped borders of adjacent parcels may not be in perfect alignment even if they come from the same source; etc. As a result of these mapping discrepancies, some acreage estimates may be incorrect (when a slight discrepancy extends over several miles, the estimate can amount to many acres); area components may not sum to the whole area; and small amounts of land may be included in a proposed critical habitat unit when the intention was to exclude this land (e.g., a small amount of urban or agricultural land may be included inadvertently).

#### **5. ECONOMIC CONSULTANTS**

The analysis was directed by Industrial Economics, Incorporated (IEc), an economic consulting firm in Cambridge, Massachusetts. In conducting the analysis, IEc staff in Hawai'i and Hawai'i sub-consultants worked with the Service and with government agencies, companies, and organizations listed in the References. Decision Analysts Hawai'i, Inc. and Research Solutions, LLC, both Hawai'i-based economic consulting firms under subcontract to IEc, provided assistance to IEc on this report.

## EXECUTIVE SUMMARY

### 1. INTRODUCTION

The purpose of this report is to identify and analyze the potential economic impacts that would result from the proposed critical habitat designation for two endangered cave animals on the island of Kaua'i in Hawai'i. Section 4(b)(2) of the Endangered Species Act (the Act) requires the Service to designate critical habitat on the basis of the best scientific and commercial data available after taking into consideration the economic impact, and any other relevant impact, of specifying any particular area as critical habitat. The Service may exclude areas from critical habitat designation when the benefits of exclusion outweigh the benefits of including the areas within critical habitat, provided the exclusion will not result in extinction of the species.

The focus of this economic analysis is on section 7(a)(2) of the Act, which requires Federal agencies to insure that any action authorized, funded, or carried out by the Federal government is not likely to *jeopardize* the continued existence of any endangered or threatened species, or result in the destruction or *adverse modification* of critical habitat. Federal agencies are required to consult with the Service whenever they propose a discretionary action that may affect a listed species or its designated critical habitat. Aside from the protections provided under section 7, the Act does not provide other forms of protection to lands designated as critical habitat. Because consultation under section 7 only applies to activities that involve Federal permits, funding or involvement, the designation of critical habitat will not afford any additional regulatory protections under the Act with respect to strictly private activities. This analysis does not address impacts associated with implementation of other sections of the Act.

### 2. PROPOSED CRITICAL HABITAT DESIGNATION

Since the proposed rule to designate critical habitat for the cave animals was published on March 27, 2002, the Service anticipates some slight changes to the number of acres and units. As modified, the designation would include three critical habitat units on Kaua'i. One of the units is divided into three subunits; thus the total number of units and subunits (referred to throughout this report as "units") is five. Combined, these units cover 3,955 acres. Most of this acreage is in a flat, undeveloped area between Koloa and Po'ipu on the south shore of the island (Figure ES-1).

### 3. FACTORS AFFECTING ECONOMIC IMPACTS

The listing of the cave animals as endangered species, and the critical habitat designation for these animals are projected to have substantial direct and indirect economic impacts for the following reasons:

- All of the units except Unit 1c contain areas planned for “residential” development (i.e., housing units targeted at Kaua’i residents); “resort/residential” development (i.e., housing units targeted at non-Kaua’i residents and associated with resorts); and commercial, industrial, and/or golf-course development. Some of the proposed critical habitat also contains crop farming, areas planned for quarrying, and rights-of-way for planned roads and utilities. These plans reflect the following: (1) most of the land is suitable for development, farming, or other economic activities because of the relatively flat terrain, favorable climate, existing access, and proximity to existing developed areas; and (2) existing county land-use plans have identified the proposed critical habitat as a primary area on Kaua’i for expanding the visitor industry.
- Considerable uncertainty exists regarding the locations of the cave animals because they are very small and live underground in caves and mesocaverns (small subterranean cracks and spaces). There is a high probability that caves and mesocaverns underlie all of the areas planned for development. However, experts do not know the exact locations of most of the endangered cave animals. Any of the caves and mesocaverns that are not filled with silt and not open to the ground surface are expected to be *occupied* by the cave animals.
- The cave animals are threatened by activities that destroy or fragment caves and mesocaverns; expose them to air and light; increase siltation; remove vegetation that has rock penetrating roots (i.e., nutrients for the cave animals); involve the application of pesticides and other chemicals above the caves and mesocaverns; change the quality and quantity of the water reaching the caves and mesocaverns; etc. Most of these threats are associated with the projects, land uses and activities currently planned for the area.
- Most existing and planned projects, land uses, and activities that have no *Federal involvement* are subject to indirect costs associated with the potential for State land redistricting and conditions on redistricting; additional county review; Habitat Conservation Plans; loss of project financing; potential litigation; and court-ordered conservation management.

#### 4. SUMMARY OF ECONOMIC IMPACTS

For various economic activities in the proposed critical habitat, Table ES-1 presents quantitative and qualitative estimates of: the following: (1) direct costs attributable to the section 7 provisions of the Act; (2) indirect costs; and (3) benefits. These costs indicate the low and high

estimates for the costs and benefits that are associated with listing the cave animals as endangered species *and* with designating critical habitat for the cave animals.

#### **4.a. Direct Costs**

Over the 18-year period from 2003 to 2020, the direct costs for section 7 consultations and project modifications could exceed from \$56.5 million to \$62.3 million.

Many of the costs would be for the following: (1) infrastructure projects (roads, wastewater treatment, injections wells, etc.); and (2) private developments that are located near a natural stream or drainage. The infrastructure projects are spread throughout the area. However, the direct impacts to private developments are centered around the Waikomo Stream and what was once a natural drainage near the existing Maha'ulepu quarry.

The highest direct cost is associated with hotel and resort/residential development on a section of the Maha'ulepu coast (westernmost portion of Unit 1a; portions of Units 2 and 3). The cost includes both the direct cost to the hotel operator in the form of lost revenues as well as the island-wide “ripple” effects of a decline in the tourism and construction industries. It should be noted, however, that this project has not been approved for development.

The next highest direct cost would be for a section 7 consultation and project modification on a planned limestone quarry (southern portion of Unit 3). This direct cost includes both the direct cost to the landowner and to the quarry operator in the form of lost revenues, as well as the higher island-wide cost of limestone due to losing a local source.

#### **4.b. Indirect Costs**

The indirect impacts are significantly higher than the direct impacts. These impacts stem primarily from the lost economic and population growth associated with hotel and resort/residential development. By the year 2020, expenditures and sales would be reduced island-wide by about \$98 million per year to \$270.9 million per year.

For the entire 2003-to-2020 period, the total loss in income benefits could range from \$546.7 million to \$1.5 billion attributable to the listing and critical habitat. Also, the loss in property value could range from \$36 million to \$72 million.

Due to various uncertainties, it is possible that these economic impacts could be significantly higher or lower.

In general terms, the largest economic losses are associated with land designated in the year 2000 *Kaua'i County General Plan (General Plan)* as a Resort and Urban Center, and especially land nearer the ocean (Po'ipu) and west of Po'ipu Road (i.e., Kukui'ula). Projects in these areas generally

have higher-density development (with the exception of Kukui'ula), higher unit prices, and higher land values. Moving *mauka* (towards the mountains), the economic impacts, densities, unit prices and land values decrease gradually, but they are still substantial.

A few other areas have the potential of generating large economic impacts but, in order for development to proceed, they will require development approval by both the State and the county. The first is a hotel and resort/residential development that is located between, but partially overlapping, Units 1a, 2 and 3. The second is low-density resort/residential development between the Hyatt golf course at Makawehi Bluff and Pu'u Hunihuni. The third is industrial development adjacent to the old Koloa Sugar Mill.

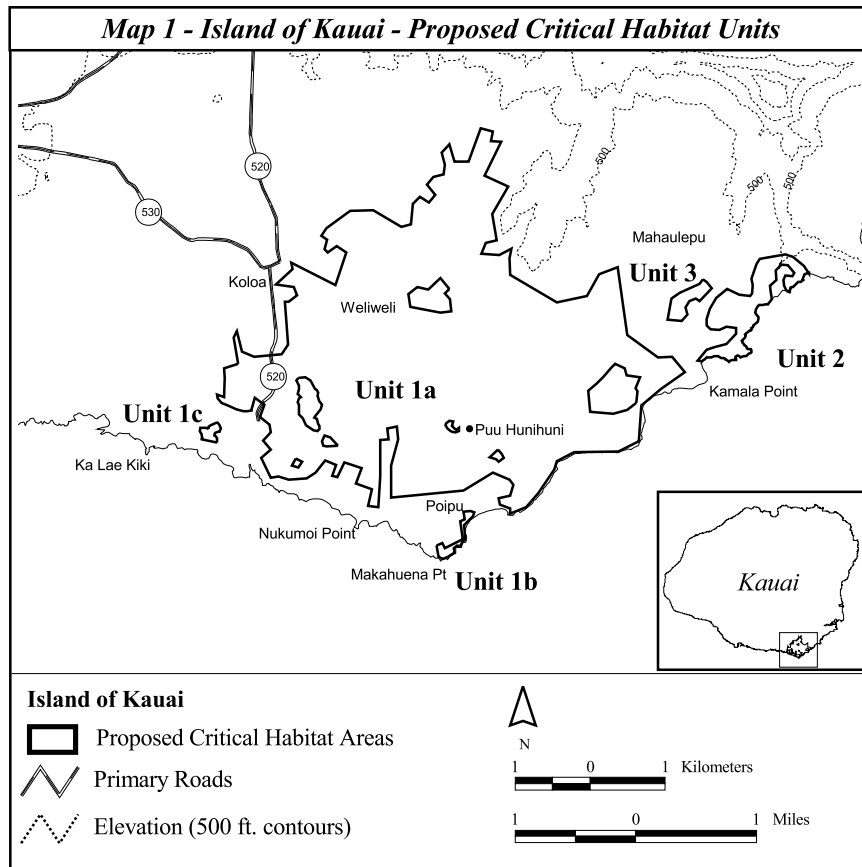
Given the small size of the Kaua'i economy, these economic impacts reflect a major loss in planned economic and population growth for the island, and reflect a major deviation from the county *General Plan*.

Additional quantifiable indirect impacts include increased environmental review for successful development projects; the preparation costs of HCPs; the effort required to contest potential redistricting; the preparation of EISs as part of State and county review; and the costs to investigate the implications of critical habitat. Although not subject to accurate quantification, other indirect costs could add substantially to the indirect costs. These impacts include the undetermined probability of additional litigation; impacts to individual residential, commercial, and industrial landowners and developers; possible losses in agricultural production; and the possibility of court-ordered land management for the cave animals.

#### **4.c. Benefits**

Economic benefits occurring as a result of designating the proposed critical habitat, and the related actions taken to enhance the cave animals habitat (e.g., landscaping with native vegetation) include: (1) the benefits associated with preserving the cave animals; (2) potential reduced costs to the Service and other entities if the preservation efforts are successful; (3) potential contribution to preserving undeveloped open space along the Maha'ulepu coast and other areas in Koloa; (4) possible reduction in soil and chemical runoff into the marine environment off Koloa because of less farming and development; (5) less traffic congestion because of less island-wide economic and population growth; (6) ecotourism benefits if the Maha'ulepu coast remains undeveloped; (7) possibly an influx of new funds from outside the State for conservation management that would contribute to expanded economic activity; and (8) better siting of projects by developers so as to avoid costly project delays and project modifications due to development that might be placed inadvertently near areas *occupied* by listed species.

**Figure ES-1. Proposed Critical Habitat Units**



**Table ES-1. Section 7 Costs and Benefits Attributable to the  
Cave Animals Listing and Critical Habitat**  
(18-year estimates)

CH = critical habitat PMs = project modifications O&M = operation and maintenance Fed = Federal ne = not estimated

Item	Total	
	Low	High
<b>DIRECT SECTION 7 COSTS</b>		
<b>Conservation Programs</b>	\$15,600	\$15,600
<b>Farming and Ranching Operations</b>		
Farm Loan Programs, Consultations	\$23,000	\$34,500
Farm Loan Programs, PMs	Minor	Minor
USDA Conservation Programs	\$92,000	\$161,000
<b>Mining and Quarrying Operations</b>		
Consultations	\$22,000	\$22,000
PMs (Does not include ripple effects)	\$8,700,000	\$10,800,000
<b>Navigational Aids</b>	None	None
<b>Religious Establishments and Cemeteries</b>		
Existing Religious Establishments and Cemeteries	None	None
New Religious Buildings	None	None
<b>Power Lines</b>	None	None
<b>Water Systems</b>		
Existing Irrigation Systems	None	None
New Irrigation Improvements	None	None
Existing Potable Water Systems	None	None
New Potable Water Improvements	None	None
<b>Roads</b>		
Existing Roads	None	None
Construction of New Roads, Consultation	\$79,400	\$79,400
Construction of New Roads, PMs	\$3,950,000	\$6,400,000
<b>Development</b>		
Resort/Residential Development, Consultations	\$26,100	\$39,300
Resort/Residential Development, PMs	\$42,900,000	\$43,200,000
<b>Golf Courses and Parks</b>		
Existing Golf Courses and Parks	None	None
Planned Golf Courses and Parks, Consultations	\$22,000	\$22,000
Planned Golf Courses and Parks, PMs	\$217,800	\$594,000
<b>Residential Development</b>		
Existing Residential Homes, Consultations	\$43,200	\$50,400
Existing Residential Homes, PMs	\$4,900	\$11,900
Planned Residential Development, Consultations	\$22,000	\$22,000
Planned Residential Development, PMs	\$143,200	\$326,700
<b>Commercial Development</b>	None	None
<b>Industrial Development</b>		
Consultations	\$22,000	\$22,000
PMs	\$21,400	\$55,400



**Table ES-1. Section 7 Costs and Benefits Attributable to the  
Cave Animals Listing and Critical Habitat**  
(18-year estimates)  
(continued)

CH = critical habitat    PMs = project modifications    O&M = operation and maintenance    Fed = Federal    ne = not estimated

Item	Total	
	Low	High
<b>Wastewater Treatment</b>		
Consultations	\$22,000	\$44,000
PMs	\$27,400	\$99,000
<b>Injection Wells</b>		
Consultations	\$21,600	\$36,000
PMs	\$60,000	\$125,000
<b>Underground Storage Tanks</b>	None	None
<b>Ecotourism</b>	None	None
<b>Natural Disasters</b>		
Fed. Emergency Management Agency, Consultations	\$7,500	\$15,000
Federal Emergency Management Agency, PMs	Minor	Minor
Farm Service Agency Disaster Assistance, Consultations	\$7,500	\$15,000
Farm Service Agency Disaster Assistance, PMs	Minor	Minor
<b>Service Incidental Take Permits</b>		
Consultations	\$62,400	\$62,400
PMs	None	None
<b>INDIRECT COSTS*</b>		
<b>Islandwide Impacts</b>		
Expenditures and Sales: 2020		
Construction Related	\$4,666,000	\$12,900,000
Hotel, Resort/Residential, and Related Activities	\$93,317,000	\$258,004,000
Total	\$97,983,000	\$270,904,000
Employment: 2020		
Construction Related	\$263	\$763
Hotel, Resort/Residential, and Related Activities	\$1,069	\$2,957
Total	\$1,332	\$3,720
Total Loss in Income Benefits: 2003 to 2020	\$546,659,000	\$1,539,107,000

\* Although the analysis does provide general estimates of some of the potential indirect costs shown below, not all of the estimates are summarized in this table. Because some of these indirect costs are highly speculative, this table instead reports qualitatively on their likelihood and magnitude. For additional information on any of these indirect impacts, the reader should refer to the economic cost and benefit chapter of the analysis. Only those costs deemed more likely to occur are included in this summary table in order to present the most probable overall impact of critical habitat designation.

**Table ES-1. Section 7 Costs and Benefits Attributable to the  
Cave Animals Listing and Critical Habitat**  
(18-year estimates)  
(continued)

CH = critical habitat PMs = project modifications O&M = operation and maintenance Fed = Federal ne = not estimated

Item	Total	
	Low	High
<b>Costs and Delays for Successful Projects</b>		
Environmental Reviews	\$108,000	\$440,000
Litigation	Large	Large
<b>Residential, Commercial and Industrial Development</b>	Moderate	Moderate
<b>Agriculture</b>	Moderate	Moderate
<b>Underground Storage Tanks</b>	None	None
<b>Habitat Conservation Plans</b>	\$3,900,000	\$7,300,000
<b>Contesting Redistricting</b>	\$1,000,000	\$1,000,000
<b>Land Management for Conservation</b>	Large	Large
<b>State and County Environmental Review</b>	\$375,000	\$975,000
<b>Reduced Property Values</b>	\$36,000,000	\$72,000,000
<b>Condemnation of Property</b>	None	None
<b>Costs to Investigate Implications of CH</b>	\$225,000	\$526,000
<b>Loss of Conservation Projects</b>	None	None
<b>TOTAL COSTS</b>		
Direct	\$56,513,000	\$62,252,600
Indirect	\$686,251,332	\$1,892,255,720
Direct and Indirect	\$742,764,332	\$1,954,508,320
Discounted Present Value**	\$415,085,054	\$1,092,253,837
Annualized**	\$41,264,685	\$108,583,796
<b>BENEFITS</b>		
<b>Benefits of Species Preservation</b>	Significant	Significant
<b>Reduced Costs Due to Successful Preservation</b>	Large	Large
<b>Environmental Benefits and Other Benefits</b>		
Open Space, Maha'ulepu Coast	Significant	Significant
Other Open Spate	Significant	Significant
Soil and Chemical Runoff	Small	Small
Traffic Congestion	Large	Large
Native Plants	Significant	Significant
<b>Ecotourism</b>	Small	Small
<b>Economic Activity Generated by Conservation</b>	Possibly	Possibly
<b>Management</b>	Large	Large
<b>Benefits to Developers</b>	Minor	Minor

\*\* Present value and annualized calculations are based on the OMB prescribed seven percent discount rate and the assumption that total costs are distributed evenly over the entire period of analysis.

## THE CAVE ANIMALS AND PROPOSED CRITICAL HABITAT<sup>1</sup>

## CHAPTER I

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Under the Endangered Species Act of 1973, as amended (the Act), the United States Department of the Interior, Fish and Wildlife Service (the Service) proposes to designate critical habitat for two cave animals that have been listed by the Service as endangered species on the island of Kaua'i in Hawai'i. This chapter provides information on the cave animals and the proposed critical habitat units, most of which comes from the document "Endangered and Threatened Wildlife and Plants; Determination of Critical Habitat for the Kaua'i Cave Wolf Spider and Kaua'i Cave Amphipod" (the proposed rule), published in the *Federal Register* on March 27, 2002 (67 FR 14671). In addition, the Service provided valuable information for this chapter in the form of overlay resource maps and detailed acreage data.

### 1. THE CAVE ANIMALS

The two cave animals are the Kaua'i cave wolf spider (*Adelocosa anops*) and the Kaua'i cave amphipod (*Spelaeorchestia koloana*), both of which are small invertebrates that lack eyes and live in portions of underground lava tubes, caves, passages, etc. The Kaua'i cave spider is 1/2- to 3/4-inch long, and the Kaua'i cave amphipod is 1/4- to 2/5-inch long. The proposed rule contains detailed descriptions of the cave animals and their taxonomy. Both species were listed by the Service as endangered on January 14, 2000.

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<sup>1</sup> **Note to Reader:** After reading this chapter, those who are already familiar with Kaua'i County and the Koloa District (Chapter II), the Act (Chapter III), existing protections (Chapter IV), or the approach used in conducting the economic analysis (Chapter V), may wish to skip these chapters, as appropriate, and proceed to the economic analysis (Chapter VI).

## 2. PROPOSED CRITICAL HABITAT

To protect the cave animals, the Service is proposing three critical habitat units on Kaua'i: Units 1, 2 and 3 (see Figure ES-1). The units are located in the southeast corner of the island in the Koloa District; lie between Kukui'ula on the west and Kaweliko Point on the East; and include most of the area between Koloa Town and the Waita Reservoir on the north down to Po'ipu along the coastline. For the most part, the units include undeveloped lands and farm lands, but exclude developed communities (Koloa Town, Poipu, the Weliweli residential tract and the Kiahuna Golf Course residential community), the former sugarcane mill, sewage treatment plants, and quarries.

Since the proposed rule was published on March 27, 2002, the Service has divided Unit 1 into three subunits (Units 1a, 1b and 1c) instead of the original two (see Section 4). Thus, the total number of units and subunits, referred to throughout this report as "units", is five. The proposed rule provides detailed information on the critical habitat boundaries and map coordinates of boundary points as originally proposed.

As stated in the proposed rule, the proposed critical habitat generally includes areas having cave-bearing rock that underlies: (1) areas with minimum or moderate surface modification, and (2) undeveloped areas. It also includes undeveloped areas lying between known *occupied* caves, since they are likely to contain subterranean spaces and voids that provide both habitat and corridors for movement of the cave animals between foraging sites and subpopulations.

Also explained in the proposed rule, some existing and past land-use improvements and activities have significantly modified the surface conditions in the proposed critical habitat. These improvements and activities include: crop farming (sugarcane, coffee, seed corn, truck crops, etc.); grazing; golf courses and parks; unimproved roads; and some homes and yards. The affected areas (about 80 percent of the proposed critical habitat) are included in the proposed rule because the improvements and activities did not severely alter the underlying bedrock and subterranean habitat for the cave animals.

Certain areas that lie within the boundaries of the proposed critical habitat are excluded from it because they lack the *primary constituent elements* for the cave animals. These areas are listed in Section 4 below.

## 3. PRIMARY CONSTITUENT ELEMENTS

The proposed rule indicates that the proposed critical habitat provides the full range of *primary constituent elements* essential for the conservation of the cave animals. The *primary constituent elements* for the cave animals are based on two environmental parameters:

— Caves and Mesocaverns

Caves are defined in the proposed rule as subterranean spaces 10 inches or more at their narrowest dimension (usually the height), while mesocaverns are subterranean spaces from 0.2 inch to 10 inches. In order to provide suitable habitat for the cave animals, these spaces must be dark, contain stagnant air, and maintain microclimates with the humidity at saturation levels.

The cave animals have adapted to these dark and humid conditions and are now believed to require these conditions in order to survive. They use the larger spaces for foraging, and it is possible that this is where they spend most of their time. The smaller spaces provide shelter from intrusions. Also, the caves and mesocaverns may be used as passages connecting foraging sites and populations of cave animals.

— Roots of Living Non-Toxic Plants within the Caves

Roots of living non-toxic plants that grow down into the caves and mesocaverns provide a sustainable food source for the amphipods and other herbivores. In turn, the amphipods serve as a food source for coevolved predators such as the Kaua'i wolf spider.

All caves that have been surveyed in the Koloa District that contain the *primary constituent elements* have contained at least one of the two cave animals.

#### 4. EXCLUDED AREAS, FEATURES AND STRUCTURES

Since the proposed rule was published, the Service has identified an area of approximately 238 acres of the planned Kukui'ula development that was mass-graded. The grading took place in the early 1990s before the cave animals were listed as endangered. Because of the grading, this area does not contain the *primary constituent elements* for the cave animals. Consequently, the Service has indicated that the boundaries in the final rule for the critical habitat will be remapped to exclude this area; it is also excluded from the map shown in Figure ES-1. However, an 11-acre parcel within the development site was not mass-graded and will remain in critical habitat as Unit 1c.

Also, some existing man-made features and structures have resulted in below-ground modifications and alterations. These areas do not contain, and are not likely to develop, *primary constituent elements*. As a result, the proposed rule excludes these man-made features and structures from the critical habitat. The operation and maintenance of these man-made features and structures generally would not be impacted by critical habitat designation.

Some of the existing man-made features and structures are small and so cannot be excluded easily by remapping new unit boundaries. In effect, they are "unmapped holes" that are found

within the boundaries of critical habitat units but are not considered by the Service to be part of the critical habitat. As explained in the proposed rule, only those areas with one or more PCEs are included in critical habitat. Since these “unmapped holes” do not include PCEs, they are not included in critical habitat.

The excluded man-made features and structures include those in the proposed rule and others added by the Service by internal Service memorandum of August 14, 2002 and personal communication of August 29, 2002. The complete list follows:

- Homes and buildings for which the underlying bedrock has been altered (i.e., for the foundation, utilities, etc.)
- Cemeteries
- Paved roads and major plantation (cane-haul) roads
- Potable water systems (water tanks, water mains, distribution pipes, etc.)
- Irrigation systems (reservoirs, ditches, pipes, etc.)
- Sewage systems (collection pipes, main pipes, settling ponds, injection wells, septic tanks, leach fields, etc.)
- Drainage systems (ditches, conduits, drainage basins, dry wells, etc.)
- A large rock-lined drainage ditch in the Kukui'ula development site
- Disturbed areas of current and former quarries
- Underground tanks (fuel, water, etc.)
- Electrical and communications systems (underground corridors and conduits, utility poles, etc.)

Regarding the above list, the boundaries of the proposed critical habitat were drawn to exclude large quarries. Also, the large rock-lined drainage ditch in the Kukui'ula development site is sufficiently large to be excluded by redrawing the boundaries of the critical habitat.

## **5. UNDERGROUND FEATURES**

### **5.a. Lava-Tube Caves**

Most of the caves in the proposed critical habitat are the remnants of lava tubes found throughout much of Koloa. Lava tubes are formed during volcanic eruptions when the surface of a lava flow cools and solidifies while the still-molten interior continues to drain downslope and leaves partially empty conduits (caves and passages) beneath the surface. During long-lasting eruptions, the molten lava tends to become channeled into a few main “streams” that can run for many miles, and are never more than a few meters below the surface. In addition, smaller tubes often run parallel to the main tubes. Also, main lava tubes tend to branch out into smaller tubes that flow away from the main tubes.

Lava tubes are rarely continuous because segments of them will drain while other segments will dam up and the lava hardens inside the tube. Thus the entire length of a lava-tube corridor will be comprised of sealed segments and open segments. Most of the corridor will be entirely underground, but some portions may open to the surface. Thus the resulting cave structure can be accessed at the beginning of the lava tube, at the end, through vents where gases from the molten lava exited the tube, or at points where the tube roof has collapsed. Roof collapses are common because the tops of lava tubes are comparatively thin—no more than a few meters thick.

In the Koloa District, as elsewhere in Hawai'i, the lava tubes tend to run *mauka-makai* (i.e., from the mountains to the ocean). From west to east in the Koloa area, there are four major lava-tube systems, and possibly a fifth system, that are known to exist because of visible surface openings. They are: Kukui'ula Caves, Koloa Caves, Kiahuna Caves, Fallout Shelter Cave, and a possible tube east of Koloa Mill. The major lava tubes may vary from less than 12 feet wide to over 40 feet wide, and from less than 2 feet high to over 12 feet high (Hammatt, 2001). Although these lava-tube systems have not been mapped, it is quite possible that they run all the way down through the Koloa District to the ocean. As recently as 1999, a major cave thought to be associated with the Kiahuna Caves was discovered during construction of the Koloa Bypass Road.

In addition to the known lava-tube systems mentioned above, other systems may exist in Koloa but have not yet been discovered (Bishop Museum, 2002).

Caves that open to the surface are often found by above-ground visual scientific surveys, typically during archaeological or biological surveys. Such visual surveys will also reveal geological formations—such as air passages, holes and fissures—which strongly suggest the presence of underlying caves. However, many caves can only be found through test borings, excavations, collapsing the roof of a lava tube, or other means that affect the cave structure.

Taking into account the major lava-tube systems that have been identified in Koloa, their likely underground extensions, other major lava-tube systems that may exist in Koloa but have not yet been discovered, small parallel lava tubes, and small branches that flow away from the main tubes, it is reasonable to assume that caves 10-inches and larger partially underlie nearly all existing and planned developments in the proposed critical habitat. Most of these caves, and particularly the smaller ones, are not open to the surface. The prevalence of caves throughout Koloa is supported by test borings, excavations, and other land disturbances in various locations in Koloa (Geolabs, Inc. and University of Hawai'i, School of Ocean Earth Science and Technology, 2002).

Even though caves are likely to be found throughout Koloa, some have filled with sediment. This is most likely to have occurred with caves under agricultural lands that were cultivated in sugarcane for over 100 years, in urbanized areas, around dry wells, and under drainage basins used for ground infiltration of storm waters.

**5.b. Limestone Caves**

Some of the caves in the proposed critical habitat are formed from limestone rather than from molten lava. In the proposed critical habitat, limestone caves are likely to be found only along the Maha'uilepu coastline in Unit 1a, and in Units 1b, 2 and 3.

Unlike lava-tube caves, which are not readily soluble and can be filled with sediments and disappear, limestone caves re-form continuously and often become larger over time. This occurs because acidic waters from the surface dissolve away the calcium carbonate bedrock. And when erosion fills limestone caves with sediment, the water flow quickly finds a different path and enlarges another void.

Because limestone caves reform continuously, habitat for the cave animals can remain suitable for very long time spans.

**5.c. Mesocaverns**

Mesocaverns (voids, cracks and passages) form when molten lava shrinks and cracks upon cooling. Younger lava flows, such as the one in the Koloa District, have an abundance of mesocaverns throughout the flow. Mesocaverns also form in association with limestone caves. Furthermore, the cave habitat (for both lava-tube caves and limestone caves) almost always contains mesocaverns, and some of these mesocaverns possess the dark and stagnant conditions required by the cave animals.

Thus, it is assumed that all or nearly all of the proposed critical habitat contains suitable mesocavern habitat. However, as with the lava-tube caves, some of the lava mesocaverns have filled with sediment.

**6. DISTRIBUTION OF THE CAVE ANIMALS**

As summarized in the proposed rule, the Kaua'i wolf spider has been observed in only five caves in the Koloa area since its discovery in 1971. The spiders are generally found in the back recesses of caves in dark and stagnant air zones. Since 1998, the spiders have been encountered regularly in only two of the caves during biannual monitoring. In one of these caves, the population is declining while the population of the brown violin spiders is increasing; this is an alien species that likely preys upon both the Kaua'i cave wolf spider and Kaua'i cave amphipod.

To date, the Kaua'i cave amphipod has been found in six caves in the Koloa area but is encountered regularly in only three of them.

The Service roughly estimates that about one in ten (10 percent) of the caves found during visual surveys of the ground surface will be *occupied* by one or both of the cave animals. However,



a higher percentage of the surface caves may, in fact, be *occupied* because the cave animals may live in the deep inaccessible recesses of these caves.

Further, it is believed that all of the sealed caves (i.e., caves that are not open to the surface) that have not been filled with sediment may be *occupied* by the cave animals, or may be used as dispersal routes to other foraging locations if insufficient food is available within the caves (Bishop Museum, 2002). Sealed caves are far more likely to contain habitat conditions favorable to the cave animals than are caves that are open to the surface. This is supported by the fact that the one sealed cave that was recently discovered (during construction of the Koloa Bypass Road) was *occupied*.

Since it is assumed that caves 10-inches and larger partially underlie nearly all existing or planned developments in the proposed critical habitat, and most of these are sealed, it is reasonable to assume that *occupied* caves and caves used for dispersal underlie nearly all existing or planned developments in the proposed critical habitat.

## 7. THREATS TO THE CAVE ANIMALS

The proposed rule discusses various activities that could directly or indirectly harm cave animals or their habitat. These activities could take place within *occupied* or *unoccupied* caves and mesocaverns, at cave entrances, and above or near caves and mesocaverns, etc. Many involve construction activity (homes, buildings, roads, utilities, etc.), landscaping (yards, golf courses, grounds), crop farming, cattle grazing, and grounds maintenance (yards, golf courses, and other landscaped areas). Activities of concern include, but are not limited to, those which:

- Destroy or fragment caves and mesocaverns (e.g., by blasting, grading, trenching, collapsing or crushing caves, compacting the ground, grouting or filling voids so as to prepare land for foundations; trenching for utilities; digging dry wells; road construction; etc.).
- Cause caves and mesocaverns to be filled with sediments (e.g., by construction grading or plowing of fields so as to disturb the soil and increase soil runoff).
- Change airflow and light penetration, thereby exposing cave animals to potential desiccation (e.g., unsealed test borings; construction activity that creates new cave openings, enlarges cave openings and the caves themselves; etc.).
- Involve the disposal of wastes, rocks, soil, wastewater, etc., in caves.
- Change plant roots that grow down into caves or change perennial surface vegetation above or adjacent to caves (e.g., by burning, uprooting, cutting,

herbicide application, overgrazing, grading, construction, road building, mining, etc.).

- Introduce soils from outside Hawai'i that might carry a disease that could sweep through all or part of the cave-animal populations.
- Change water quality or quantity that affects vegetation above or in caves; reduces humidity levels in caves and mesocaverns; floods habitat; or transports toxic materials (e.g., pesticides, fuel, solvents, or other household or industrial chemicals) into the habitat (e.g., by water diversion, water impoundment, groundwater pumping, water disposal into potential habitat, and prevention of natural water recharge).
- Involve the application of chemicals (pesticides, herbicides, insecticides, fungicides, etc.) within, above, or adjacent to known habitat (e.g., pest control related to farming and maintenance of yards, golf-courses, and other landscaped areas).
- Release biological control organisms (predators, parasitic insects, fungi, bacteria, and other natural or bioengineering biocontrol animals) within, above, or adjacent to the habitat.
- Introduce predators, parasitic insects, diseases, disease-causing organisms, competitors, or invasive plant species within, above, or adjacent to known habitat.
- Involve human visitations to caves (risks include trampling or disturbance of food sources, leftover garbage that attracts cockroaches and other predators and competitors, cigarette smoke and butts (nicotine is a potential insecticide), wood-fire smoke, etc.).
- Introduce pollutants into the caves and mesocaverns (e.g., by a fuel or oil spill).
- Increase the risk of fire within, outside or above a cave, thereby risking harm to the cave animals due to fire or smoke.

## **8. CONSERVATION AND RECOVERY**

Although a conservation and recovery plan for the cave animals has not been completed by the Service, likely components of the plan, based on information presented in the proposed rule and in discussions with the Service, are:

- Protect from threats all *occupied* caves, *unoccupied* caves that offer suitable habitat, areas around suitable caves, areas where suitable caves are likely to be found, and mesocaverns that provide connecting corridors between caves. Such protections would include locked gates and possibly rock walls that limit access to caves, and 100-foot-wide buffers above protected caves and corridors.
- Seal and protect suitable caves that may be found during construction or other activities.
- For protected caves that lack appropriate food resources, plant and care for native plants that will grow roots long enough to reach through the roofs of the caves.

The intent of these actions would be to improve the chances of survival of the cave animals by: (1) protecting existing populations of cave animals by protecting their habitat, areas that provide shelter in case disturbances, and corridors between caves; (2) increasing their numbers in caves having low populations because of inadequate food; (3) increasing genetic exchange between populations; (4) increasing access to additional suitable habitat and food sources; (5) recolonizing former habitat and thereby increasing their range.

## **9. SURFACE AND OTHER FEATURES**

Based on the proposed rule and other sources, this section and Table I-1 provide information on the proposed critical habitat, including: acreages of the units, land ownership, existing land management, and existing improvements and activities in the units.

### **9.a. Acreages**

As shown in Table I-1, the proposed critical habitat units, as modified (see Section 4), encompasses 3,955 acres on Kaua'i (1.1 percent of the island).

### **9.b. Land Ownership**

None of the area proposed for critical habitat is owned by the Federal government. Approximately 70 acres (1.8 percent of the proposed critical habitat) are owned by the State; 10 acres (0.2 percent) are owned by Kaua'i County; and 64 acres (1.6 percent) are owned by the Roman Catholic Church.

At 3,360 acres (85 percent), major private landowners own the majority of the land in the proposed critical habitat (the Service defines "major landowners" as owners of at least 500 acres in Hawai'i). Minor private landowners own 407 acres (10.3 percent).

The remaining 44 acres (1.1 percent) within the boundaries of the proposed designation are covered by county and private roads. However, as noted earlier, existing roads are excluded from the designation.

**9.c. Existing Land Management and Controls**

Land in the proposed critical habitat is subject to a variety of existing land-use regulations and land-management programs that govern and, to varying degrees, limit development and other land-use activities. These include: Federal programs, State land-use controls and programs, county land-use controls, and land management by various public and private organizations. Applicable regulations and land-management programs are described in Chapter IV. Acreages for each type are summarized in Table I-1.

As indicated in the table, none of the proposed critical habitat is controlled by the Federal government as a national park or refuge. However, the Service does have responsibility in Koloa for protecting six populations of species other than the cave animals that are listed as threatened or endangered species.

At the State level, approximately 136 acres (3.4 percent) of the land proposed for critical habitat are in the State Conservation District; 3,096 acres (78.3 percent) are in the State Agricultural District; and 725 acres (18.3 percent) are in the State Urban District. In general, development and commercial activity is limited in the Conservation District with varying levels of restrictions based on the applicable Subzone (see Chapter IV for full a discussion).

Land in the State's Urban, Rural, and Agricultural Districts is subject to county land-use and development controls. These include the Kaua'i County General Plan, district plans, zoning, and building-code regulations affecting residential, commercial, industrial and agricultural development and land use.

In Special Management Areas (SMAs) located along the shoreline, the county has an additional layer of regulation that provides special controls on development, even for land located within the Conservation District.

**9.d. Existing Improvements and Activities**

At the bottom of Table I-1, the section entitled "Improvements/Activities" identifies existing improvements and activities found in each of the proposed critical habitat units. The double asterisks (\*\*) in the table indicate existing man-made features and structures that are found within the boundaries of the proposed critical habitat, but these improvements are "unmapped holes" that are not part of the critical habitat (see Section 4).

Except for the improvements and activities listed in Table I-1, most of the area proposed for critical habitat within the Agricultural District is used for crop farming and grazing, and most of the land in the other districts is covered with scrub brush (mostly *kiawe*). None of the units contains existing military, resort or industrial developments.

**9.e. Suitability for Economic Uses**

Most of the land in the proposed critical habitat that is in the State Agricultural District is suitable for crop farming as indicated by the deep soils, good access, and availability of irrigation water. However, nearly all of the land in the other State districts is not suitable for crop farming, primarily because of shallow, rocky soils.

From a development perspective (and ignoring county plans and future market conditions), nearly all of the land in the proposed critical habitat is suitable for urban development because it has gentle slopes, good access, and is near existing infrastructure and other developed areas. However, it is unlikely that Unit 1c would be developed because it contains significant archaeological resources.

**Table I-1. Information on Proposed Critical Habitat Units for the Cave Animals**

Item	Units	All Units		Unit 1a	Unit 1b	Unit 1c	Unit 2	Unit 3
		Total	Share					
<b>Total Area*</b>		3,955		3,726	17	11	168	34
<b>Land Ownership</b>								
Federal	Acres	-	0.0%	-	-	-	-	-
State	Acres	70	1.8%	70	0.2	-	-	-
County	Acres	10	0.2%	10	-	-	-	-
Church	Acres	64	1.6%	64	-	-	-	-
Private, Major Owner	Acres	3,360	85.0%	3,147	-	11	168	34
Private, Minor Owners	Acres	407	10.3%	391	16	-	-	-
County and Private Roads	Acres	44	1.1%	44	-	-	-	-
<b>Federally Controlled or Managed</b>								
National Parks or Refuges	Acres	-	0.0%	-	-	-	-	-
FWS, non-cave animals populations	Count	6		6	-	-	-	-
<b>State-Controlled or Managed</b>								
Conservation District	Acres	136	3.4%	55	5	-	76	-
Protective	Acres	-	0.0%	-	-	-	-	-
Limited	Acres	136	3.4%	55	5	-	76	-
Resource	Acres	-	0.0%	-	-	-	-	-
General	Acres	-	0.0%	-	-	-	-	-
Special	Acres	-	0.0%	-	-	-	-	-
<b>County-Controlled or Managed</b>								
Agricultural District	Acres	3,096	78.3%	2,970	-	-	92	34
Urban and Rural Districts	Acres	725	18.3%	702	11	11	-	-
Special Management Areas				shore-line	shore-line	shore-line	-	shore-line
<b>Improvements/Activities</b>								
Paved Roads **	Count	14		14	-	-	-	-
Unpaved Rds or 4-wd Trails	Count	27		26	-	-	1	-
Navigational Beacon	Count	1		-	1	-	-	-
Irrigation Improvements **	Count	15		15	-	-	-	-
Injection Wells **	Count	2		2	-	-	-	-
Power Transmission Lines	Count	2		2	-	-	-	-
Single Family Homes	Count	62		62	-	-	-	-
Commercial and Other Structures	Count	9		9	-	-	-	-
Heiau	Count	7		5	1	1	-	-
Golf Courses	Count	2		2	-	-	-	-
Beach Recreation Areas	Count	2		1	1	-	-	-
Cemetery	Count	1		1	-	-	-	-
Crop Farming	Present	1		1	-	-	-	-
Cattle Grazing	Present	1		1	-	-	-	-

\* Entries may not sum to totals due to rounding, slight acreage discrepancies, and overlapping land-management areas.

\*\* Man-made features within critical habitat units, but excluded from critical habitat.

## PHYSICAL AND SOCIOECONOMIC PROFILE OF KAUAI COUNTY AND THE KOLOA DISTRICT<sup>2</sup>

## CHAPTER II

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To provide the context for evaluating the economic impacts of the proposed critical habitat designation, this chapter presents (1) physical descriptions of the island of Kaua'i and the Koloa District; (2) socioeconomic profiles of Kaua'i County and the Koloa District; and (3) the outlooks for growth and socioeconomic change for Kaua'i County and the Koloa District. The information was gathered primarily from the Hawai'i Department of Business, Economic Development & Tourism (DBEDT), *The State Data Book*, 2000; DBEDT, *Population and Economic Projections for the State of Hawai'i to 2025*, February 2000; the Hawai'i Agricultural Statistics Service, *Statistics of Hawai'i Agriculture*, 2000; and County of Kaua'i Planning Department, *Kaua'i General Plan*, November, 2000.

### 1. PHYSICAL DESCRIPTIONS

#### **1.a. Island of Kaua'i**

Kaua'i is the northernmost and oldest of the eight major Hawaiian Islands. Built from layers of basaltic lava, most of the island was formed from eruptions of a single, large shield volcano about 3.6 million to 5.6 million years ago. This highly eroded 553-square-mile island has a mountainous interior, deep canyons and valleys that extend from the interior of the island to the coast, and steep ridges and cliffs (see Figure II-1). The summit plateau constitutes the remains of a huge caldera that is now partially covered by Alakai Swamp, at about 4,000 to 4,600 feet.

Rain is delivered to the island by prevailing tradewinds which come from the northeast. Rainfall is heavy at the upper elevations, especially at Mount Wai'ale'ale—Kaua'i's second highest

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<sup>2</sup> **Note to Reader:** Readers who are already familiar with Kaua'i County may wish to skip this chapter. However, because the entire proposed critical habitat is in the Koloa District, information is presented on the role of the district in Kaua'i's economy.

point at 5,148 feet, and one of the wettest spots on earth (an average of 444 inches of rain per year). Coastal areas on the north and east side of the island average about 50 to 75 inches of rainfall per year, while the coastal plain on the south and west side of the island averages about 20 to 40 inches because it lies in the rain shadow of the mountainous interior of the island.

### **1.b. The Koloa District**

The island of Kaua'i is split into five separate districts, each of which is roughly pie-shaped and contains land from the mountains (the tip of the pie) to the sea. The Koloa District lies in the southeastern portion of the island.

Koloa is composed of the youngest rock on Kaua'i, known as the Koloa Volcanics. Its lava flows date from between 600,000 years and 1.4 million years ago. Younger, consolidated marine deposits and lithified sand dunes lie on top of some coastal portions of the older Koloa Volcanics.

In terms of rainfall, the Koloa District is a transition zone between the wetter windward side of the island and the dryer leeward side. Rainfall in Koloa is moderate to heavy, averaging less than 40 inches along the coastline, about 75 inches 1 mile inland, and up to 150 inches in the mountains.

## **2. SOCIOECONOMIC PROFILES**

### **2.a. County of Kaua'i**

Table II-1 summarizes socioeconomic information on Kaua'i County (i.e., Kaua'i and the small nearby island of Ni'ihau). The data reflect almost entirely the population and economy of the island of Kaua'i because the privately owned island of Ni'ihau contains only 0.3 percent of the county's population and supports an even smaller percentage of the county's economic activity.

#### **2.a.(1) Population and Distribution**

In 2000, Kaua'i County had a population of about 58,500 residents, up 14.2 percent since the 1990 U.S. census. The total county population amounted to only 4.8 percent of the state population—the smallest of the four counties. Only 160 of the residents, mostly Native Hawaiians, lived on Ni'ihau.

Most Kaua'i residents live in towns around the perimeter of the island, primarily along the east and south shores, with smaller populations living in towns on the north shore. There are no towns on the northwest side of the island or in the mountainous interior.



## **2.a.(2) Housing**

In 2000, Kaua'i County had 25,330 housing units, up 43.8 percent from 1990. This figure includes resort/residential units that are used as second homes; units that are available for visitors; and units that are vacant. The increase in housing units since 1990 largely reflects growth in the number of resort/residential units. The number of housing units used solely by residents was estimated at 17,900 single-family and multi-family homes in 1997, the most recent year for which data are available.

## **2.a.(3) Primary Economic Activities**

The principal economic driving forces for the economy of Kaua'i County are tourism, agriculture, and defense expenditures.

### Tourism

Kaua'i hosted nearly 1.1 million visitors in 2000, resulting in an average of about 18,040 visitors present on the island (the average daily visitor census). Of the visitors present, approximately 90.1 percent were U.S. visitors, while most of the remainder were Japanese. Visitor expenditures on Kaua'i totaled approximately \$1.2 million in 2000, making it the dominant industry of the county.

Visitor counts declined during the 1990s, primarily due to Hurricane Iniki in November 1992, which damaged many Kaua'i hotels. The annual number of visitors and the average visitor census were down 16.4 percent and 0.9 percent, respectively, since 1990. The smaller decline in the visitor census was due to an increase in their average length of stay on the island. Even though visitor counts declined as compared to the number of annual visitors, visitor expenditures increased 26.9 percent during the 1990s. This was due to an increase in average daily expenditures per visitor. However, this increase was slightly less than the 27.7-percent increase in inflation as measured by the Consumer Price Index.

Until the terrorist attacks of September 11, 2001, Kaua'i County's visitor industry was on the rebound. Contributing factors included (1) robust economic growth in California and other western states, and (2) a new generation of commercial aircraft that can depart from the short runway on Kaua'i with sufficient fuel to fly to the U.S. mainland.

### Defense

Located in the southwest corner of Kaua'i, the Pacific Missile Range Facility (PMRF) is the world's largest instrumented multi-environment range to support surface, subsurface, air and space operations. Operations vary from small, single-unit exercises to large, multiple-unit battle-group

scenarios. Also, the research and testing operations conducted at PMRF have spawned branch operations on Kaua'i of a number of high-technology companies.

PMRF is a major contributor to the economy of Kaua'i County, particularly on the west side of the island. In 2000, PMRF employed about 870 workers. In FY 2001, expenditures for PMRF and other smaller defense operations on Kaua'i totaled about \$144 million. While defense expenditures are substantial for this small economy, they amount to only 12 percent of visitor expenditures on the island.

### Agriculture

For more than a century, sugarcane was the economic mainstay on Kaua'i. However, the industry has suffered major contractions since the late 1960s. Four of five plantations on Kaua'i have closed, and about 46,100 acres of land have been released from sugarcane cultivation. Some of these fields have been planted in diversified crops, including coffee, seed corn, papaya, tropical specialty fruits, vegetables, melons, flowers and nursery products. Also, some fields have been converted to aquaculture, and some have been used for residential and other urban development. However, most of the former sugarcane land is now used for grazing cattle, which is a comparatively low-value use of the land.

Due to the contraction in the sugar industry, revenues from crops, livestock and aquaculture sales declined from \$64.4 million in 1990, to \$48.5 million in 2000. As a result, agriculture is now the smallest of the three major industries in Kaua'i County, with sales representing only 4 percent of visitor expenditures and 33.7 percent of defense expenditures.

Nevertheless, the release of sugarcane land allowed diversified agriculture to grow from \$24.5 million in 1995, to \$29.8 million in 2000—an increase of 21.6 percent over a 5-year period.

### **2.a.(4) Labor Force and Employment**

In 2000, Kaua'i County's civilian labor force numbered 29,400 workers, up 14.2 percent since 1990. But employment, which numbered 27,500 workers in 2000, was up only 11.3 percent. The contraction in the sugar industry and related industries, coupled with flat inflation-adjusted growth in tourism and insufficient growth in other industries, contributed to an unemployment rate of 6.5 percent in 2000, compared to 4.1 percent in 1990.

While employment increased during the 1990s, the number of jobs increased by a smaller percentage (11.3 percent versus 2.2 percent). Most of the jobs were concentrated in: transportation, communications and utilities; trade (retail and wholesale); services (hotel, tourism and health); government; and self-employed endeavors (including farming). The number of jobs declined in all categories except trade, services and government.

## **2.a.(5) Personal Income**

In 2000, total personal income and per-capita income for the County of Kaua'i amounted to \$1.4 billion and \$23,312, respectively—figures that were up 41.4 percent and 24.7 percent, respectively, from 1990 levels. However, per-capita income failed to keep pace with inflation, which increased 27.7 percent over this same period. As suggested by the expenditure data presented above, tourism makes the largest contribution to personal income.

## **2.b. The Koloa District**

The proposed critical habitat for the cave animals is entirely within the Koloa District. This district includes the coastal communities of Po'ipu and Kukui'ula; the inland communities of 'Ele'ele, Numila, Kalaheo, Oma'o, Lawa'i and Koloa; and the harbor and industrial area of Port Allen.

### **2.b.(1) Population and Distribution**

In 2000, the Koloa District had a resident population of 12,845, or 22 percent of the county population. This represents a 12.8-percent increase over the 1990 population of 11,368 residents. Most of the residents lived in Koloa, Po'ipu, Lawa'i, Kalaheo, and 'Ele'ele.

### **2.b.(2) Housing**

In 2000, the Koloa District had 6,340 housing units. This figure includes resort/residential units that are used as second homes; units that are available for visitors; and units that are vacant. The number of housing units used solely by residents was estimated at 3,170 single-family and multi-family homes in 1997, the most recent year for which data are available. This represented 17.7 percent of the 1997 island-wide total.

### **2.b.(3) Primary Economic Activities**

As with Kaua'i County, the primary economic activities in the Koloa District are tourism and, to a much lesser extent, agriculture. Defense is not a primary economic activity in the Koloa District since it has no military installations.

#### **Tourism**

In 1999, the Koloa District had approximately 2,360 visitor units—33.6 percent of the 7,030 total visitor units on the island and more than any other district on the island.

## Agriculture

Hawai'i's sugar industry began in Koloa in 1835 and cultivation continued in the district until 1996 when the last plantation, McBryde Sugarcane Co., Ltd., finally ceased operations.

Of the 12,000+ acres that were planted in sugarcane, some of the land has been or will be urbanized (e.g., the Kukui'ula development); about 3,400 acres are planted in coffee; some acreage is in seed corn; some is in vegetable crops; and most of the remaining land is used for low-value cattle grazing or is fallow.

### **3. OUTLOOK FOR GROWTH AND SOCIOECONOMIC CHANGE**

#### **3.a. County of Kaua'i**

Both the State DBEDT and the County of Kaua'i Planning Department have prepared economic and population projections for Kaua'i. The State projections tend to be higher than those of the county. Although elements of both projections are summarized below, greater reliance is placed on the State projections since they are based on an in-depth analysis of factors driving economic and population growth in Hawai'i and on the interrelationship among industries. Also, the State projections are the official projections to be used for infrastructure and facilities planning. Finally, it should be noted that the State has a long-established policy of directing a large share of the State's economic and population growth to the neighbor islands instead of concentrating the growth on the capital island of O'ahu. The State projections are summarized in Table II-1.

#### **3.a.(1) Population and Distribution**

DBEDT projects that the resident population of Kaua'i will increase from 58,463 in 2000, to 78,700 in 2020—a 20-year increase of 20,237 residents (34.6 percent, or compound growth of 1.5 percent per year). The county Planning Department projects that the island population will increase to between 65,300 to 74,300 residents—a 20-year increase of 6,837 to 15,837 residents (from 11.7 to 27.1 percent).

Most of the growth is likely to occur in Kukui'ula and Po'ipu along the south shore; Lihu'e, Wailua, and Kapa'a on the windward side; the Princeville area on the north shore; other existing urban centers; and in some agricultural subdivisions.

### **3.a.(2) Housing**

In order to house the projected growth in population, 2,500 to 6,700 new single-family and multi-family housing units will be needed island-wide.<sup>3</sup>

As of 2000, new development projects for approximately 12,930 single-family and multi-family housing units were “planned” for Kaua’i. A project is considered “planned” if it is designated for residential use on the land-use map in the 2000 *Kaua’i General Plan*. Individual project plans were submitted to the county Planning Department by private landowners and developers.

As indicated above, the number of housing units “planned” is significantly higher than the projected number of housing units needed by 2020. However, the county Planning Department believes that not all of the planned homes in major projects will be built by 2020; for market reasons, development may extend beyond 2020. Also, some projects may be developed at lower densities, resulting in fewer homes being built than indicated in project plans.

### **3.a.(3) Primary Economic Activities**

The primary growth sectors of the Kaua’i economy will continue to be tourism, military activities centered at PMRF and, to a lesser extent, diversified agriculture. However, given the uncertain outlook for the dominant tourism industry, combined with development controls that limit new resort development, slow to moderate economic growth is anticipated over the next 18 years.

#### Tourism

DBEDT projects that the island-wide average daily visitor census will increase from about 18,000 visitors in 2000, to 30,500 visitors in 2020—a 20-year increase of about 12,500 visitors. The county Planning Department projects that the daily visitor census will reach 24,000 to 28,000 visitors by 2020—a 20-year increase of about 6,000 to 10,000 visitors.

In order to accommodate the additional visitors, the number of new visitor units needed island-wide will range from 2,010 to 4,450 units.<sup>4</sup> These estimates are probably low in that the methodology used to estimate the number of units implicitly assumes an increase in the number of day visitors from O’ahu. However, the number of visitors on O’ahu is not expected to increase

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<sup>3</sup> The calculation of future housing-unit demand is based on county Planning Department assumptions regarding the ratio of single-family units to multi-family units, and the average household size for single-family units and multi-family units.

<sup>4</sup> The calculation of future visitor-unit demand is based on county Planning Department assumptions regarding the number of visitors per unit, the historic average occupancy rate, and the number of existing visitor units in 1999.

significantly, and many of the future visitors to Kaua'i are expected to fly directly from the mainland instead of connecting through Honolulu. Adjusting for little growth in the number of day visitors to Kaua'i from O'ahu, the number of new visitor units needed by 2020 increases to a range of 2,670 to 5,560 units, based on an average 75-percent occupancy rate and three visitors per occupied room.

Development projects for approximately 6,340 new visitor units were designated as “planned” in the 2000 *Kaua'i General Plan*. Some of the “planned” resort projects have already received county zoning approval and other permits.

### Defense and High Technology

At PMRF, further facilities development and operations are expected to evolve in response to technological advances and defense initiatives. Thus, PMRF and related high-technology operations are expected to play an increasing role in Kaua'i's economy.

### Agriculture

Given the closure of all but two sugar plantations in Hawai'i, the survival to 2020 of the single remaining sugar plantation on Kaua'i is uncertain.

However, diversified agriculture (i.e., all agriculture other than sugar and pineapple, and including aquaculture) is expected to grow on Kaua'i due to the increased availability of good farm land. However, growth is likely to be limited by the small Kaua'i market for fruit and vegetable crops, and by the small potential for displacing imports of fresh produce. Also, exports of Kaua'i crops to the much larger markets in Honolulu and overseas is expected to be limited due to the competitive disadvantages of supplying these markets from Kaua'i. Most crops for export must be barged or flown to Honolulu since it is the transportation center for the state. However, O'ahu farmers are at a comparative advantage because O'ahu has an ample supply of good farm land, and their trucking distances to the Honolulu markets and to overseas shipping terminals and air-cargo terminals are short.

As indicated in Table II-1, the State projects a decline of 150 agricultural jobs—from 950 jobs in 2000, to 800 jobs in 2020. The decline could be greater if the last remaining sugar plantation on Kaua'i were to close. Also, these figures do not include the expected increase in the number of self-employed farmers; instead, these farmers make up a share of the increase in the total number of self-employed workers.

The county projects much higher growth in agriculture, with farm employment reaching 2,200 to 3,100 jobs in 2020.

### Other Economic Activities

In order to diversify the economy, the county is pursuing additional economic activities, including the film and high-tech industries.

#### **3.a.(4) Employment**

DBEDT projects a significant increase in civilian employment by 2020: from 34,250 jobs in 2000, to 52,100 jobs in 2020 (a 52-percent increase). However, the county Planning Department projects slightly fewer jobs in 2020: ranging from 40,370 to 45,010 jobs.

The largest increase in the number of jobs is expected to occur in trade (retail and wholesale); finance, insurance and real estate; services (hotel, tourism and health); and self-employed workers.

#### **3.a.(5) Personal Income**

By 2020, and expressed in 2000 dollars, total personal income and per-capita income for Kaua'i County are projected to reach \$2.3 billion and \$29,000, respectively. These figures amount to a 20-year increase of 67.3 percent and 24.4 percent, respectively. Growth in tourism is expected to make the largest contribution to personal income.

### **3.b. Koloa District**

#### **3.b.(1) Land Use Map of the *Kaua'i General Plan***

Figure II-2 shows the Land Use Map for the Koloa District (also called the Koloa-Po'ipu-Kalaheo Planning District) as given in the 2000 *Kaua'i General Plan*. As indicated, the dominant land uses are agriculture, residential, and resort. This plan is meant to guide long-term growth for the district. However, the plan itself will be updated occasionally in response to new and changing opportunities, markets, economic conditions, environmental concerns, community values, etc.

#### **3.b.(2) Population and Housing**

Population projections and other projections for Kaua'i are not made by district. However, for the Koloa District, development projects for approximately 3,565 new single-family and multi-family homes for residents were designated in the *Kaua'i General Plan* as "planned." This represents 27.6 percent of the 12,930 total homes that are "planned" island-wide, and the largest share of growth among the five districts.

Most of the 3,565 planned homes in the Koloa District are to be located west of the Koloa Bypass Road and just north of the existing resort development in Po'ipu. Additional development is planned west of Po'ipu Road in the Kukui'ula master planned community.

Since the 2000 *Kaua'i General Plan* was published, development plans for certain areas of the Koloa District have changed. For example, certain developers intend to reduce the density of their projects, while some intend to market their units as visitor units.

Based on current information from developers, the number of potential and planned housing units in the Koloa District is about 2,100 homes.

### **3.b.(3) Primary Economic Activities**

Tourism is expected to grow and increase its share of the district economy. Agriculture is also expected to grow, but its share of the economy is likely to decline.

#### Tourism

For the Koloa District, development projects for approximately 2,500 visitor units were designated in the *Kaua'i General Plan* as “planned.” This represents 39 percent of the 6,340 visitor units that are “planned” island-wide, and the largest share of growth among the five districts.

Most of the new visitor units in the Koloa District are planned for the shoreline area south of Po'ipu Road between Po'ipu Beach Park and Koloa Landing. Additional visitor units are planned on Kukui'ula Bay and near the existing Kiahuna Golf Course.

Since the 2000 *Kaua'i General Plan* was published, new information provided by developers indicates that certain areas in the Koloa District are likely to be developed at a higher density of visitor units than what was reflected in the *Plan*, while others are likely to be developed at a lower density. In addition, some developers had not submitted their development plans to the county Planning Department before the *Kaua'i General Plan* was published.

Based on current information from developers, the number of potential and planned visitor units in the Koloa District is about 3,000 units. This estimate reflects the 2,500 units designated by the *Kauai General Plan*; a number of developments planned for the area that were not submitted in time to be included in the *General Plan*; and the likelihood that some development may occur at a higher density than designated by the *General Plan*.

The economic importance of tourism in Po'ipu is discussed below.



### Agriculture

Future agricultural activity is not projected by district in Kaua'i. However, just as with Kaua'i County as a whole, future agricultural activity in the district is likely to involve gradual expansion of diversified agriculture. Nevertheless, much of the land is likely to remain in coffee and grazing.

#### **3.b.(4) Economic Importance of Po'ipu**

As discussed above, the future economic health of the County of Kaua'i will depend primarily on the growth of the visitor industry, and the largest share of this growth is planned for the Po'ipu area of Koloa. Thus, tourism development in Po'ipu is critical to the economic future of the island.

Furthermore, Po'ipu offers a unique combination of assets for tourism development, including: (1) good beaches that are sheltered from the normal tradewinds (unlike the windward side of the island where the winds blow onshore); (2) a sunny climate and low rainfall (unlike the north shore and windward side which receive more rain); (3) a substantial investment in infrastructure made over a period of about 40 years; (4) a sufficient number of visitor units and visitors (i.e., a critical mass) to support recreational activities, restaurants, shopping, and entertainment which, in turn, help attract visitors; (5) strong name recognition and a favorable reputation among visitors; and (6) community and government support for additional resort development.

These assets translate into high occupancy rates, high room rates, high real estate values, and high tax revenues. They also provide the potential for expanding the Kaua'i economy, and increasing employment and personal income.

This is a detailed topographical map of the island of Oahu, Hawaii. The map uses contour lines to represent the island's rugged terrain, with prominent peaks like Mt. Waialeale and Mt. Kilauea clearly marked. The coastline is shown with various bays and harbors, including Hanalet Bay, Kilauea Bay, and Makahuena Point. Numerous valleys are labeled, such as Waipahoehoe, Waipahoehoe, and Waipahoehoe. The map also indicates the locations of many towns and cities, including Honolulu, Hilo, Kailua, and Kapaia. A scale bar at the bottom left indicates distances in miles (0 to 3). The map is oriented with North at the top.

**Table II-1. Socioeconomic Characteristics of the County of Kaua'i**

Item	1990	2000	Change Since 1990	Projections for 2020 <sup>1</sup>	Change From 2000
<b>Resident Population</b>	51,177	58,463	14.2%	78,700	34.6%
<b>Homes</b>	17,613	25,331	43.8%	n/a	n/a
<b>Visitors</b>					
Annual Visitors	1,286,360	1,074,821	-16.4%	n/a	n/a
Average Visitor Census	18,200	18,041	-0.9%	30,500	69.1%
U.S. Visitors	17,200	16,254	-5.5%	n/a	n/a
Foreign Visitors	1,000	1,787	78.7%	n/a	n/a
<b>Income from Major Industries (\$ million)</b>					
Visitor Expenditures	\$ 945.8	\$ 1,200.0	26.9%	n/a	n/a
Defense Expenditures	n/a	\$ 144.0	n/a	n/a	n/a
Agricultural Sales	\$ 64.4	\$ 48.5	-24.7%	n/a	n/a
<b>Labor</b>					
Civilian Labor Force	25,750	29,400	14.2%	n/a	n/a
Employed	24,700	27,500	11.3%	n/a	n/a
Unemployment Rate	4.1%	6.5%		n/a	n/a
<b>Jobs, Wage and Salary Only</b>	33,500	34,250	2.2%	52,100	52.1%
Construction, mining	1,450	1,000	-31.0%	1,300	30.0%
Manufacturing	900	500	-44.4%	500	0.0%
Transp, communications, utilities	2,400	1,750	-27.1%	2,000	14.3%
Trade	7,050	7,450	5.7%	12,400	66.4%
Finance, insurance, real estate	1,550	1,100	-29.0%	2,100	90.9%
Services and miscellaneous	7,600	9,600	26.3%	17,600	83.3%
Government	3,350	4,100	22.4%	4,900	19.5%
Agriculture	1,150	950	-17.4%	800	-15.8%
Self-employed	8,050	7,800	-3.1%	10,500	34.6%
<b>Personal Income<sup>2</sup></b>					
Total (\$ million)	\$ 965	\$ 1,365	41.4%	\$ 2,283	67.3%
Per capita	\$ 18,692	\$ 23,312	24.7%	\$ 28,999	24.4%
<b>Consumer Price Index—All Urban Consumers, Honolulu</b>	138.10	176.30	27.7%	n/a	n/a

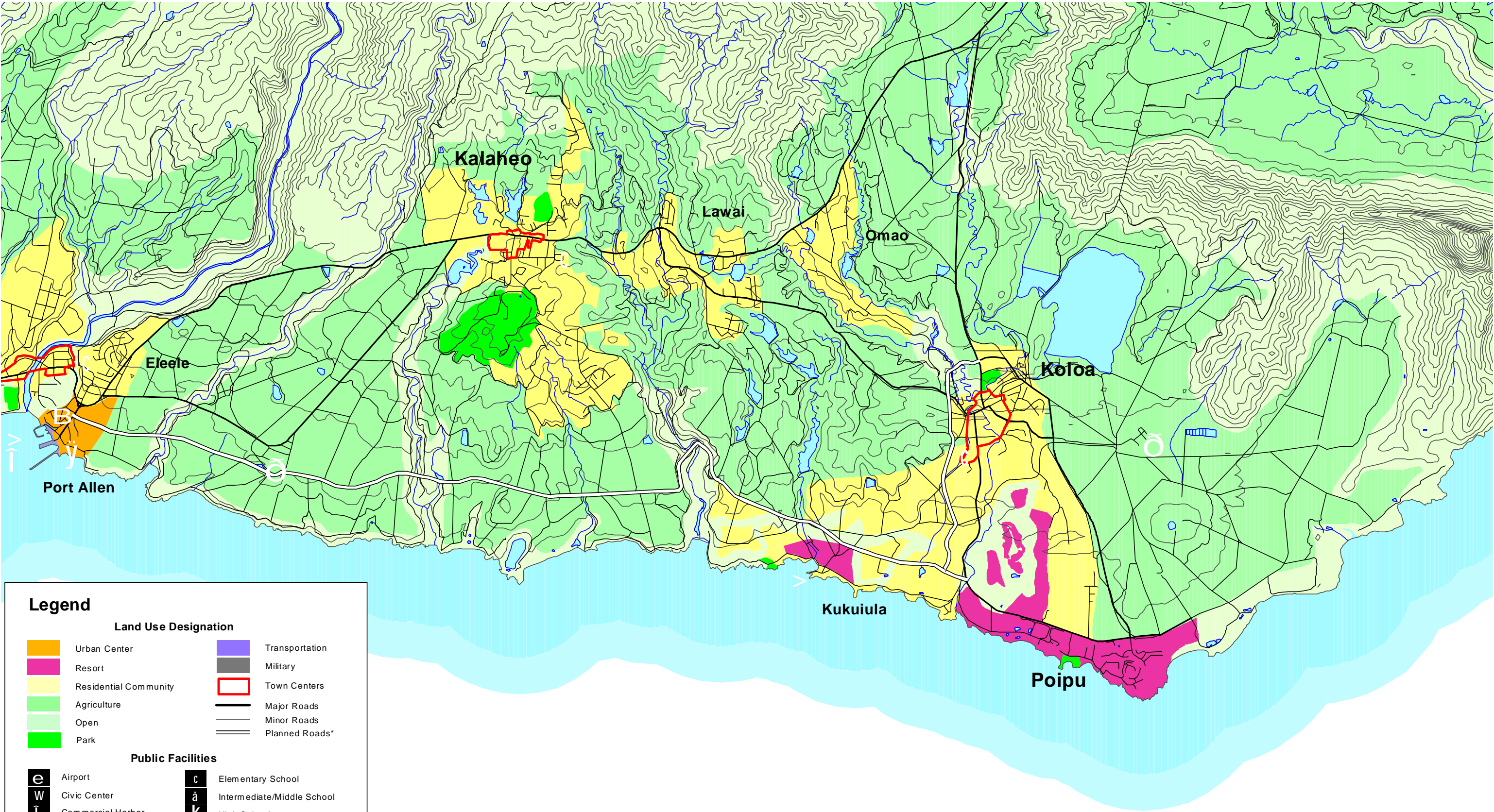
**Notes:** 1. 2020 projections prepared by the State and the county occasionally differ. The State projections are provided in this table, while both State and county projections are discussed in the text.

2. 2020 personal income projections are presented in 2000 dollars.

**Sources:** Department of Business, Economic Development & Tourism. *The State Data Book*. 2000.

Department of Business, Economic Development & Tourism. *Population and Economic Projections for the State of Hawaii to 2025*. February 2000.

Hawaii Agricultural Statistics Service. *Statistics of Hawaii Agriculture*. Annual.



# Koloa-Poipu-Kalaheo Planning District Land Use Map



## THE ENDANGERED SPECIES ACT<sup>5</sup>

## CHAPTER III

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This chapter provides relevant information from the 1973 Endangered Species Act (the Act), including the role of critical habitat designation in protecting threatened and endangered species, requirements for consulting with the Service to insure that certain Federal actions do not endanger listed species or their habitats, and prohibited activities that apply to listed species.

### 1. ROLE OF SPECIES LISTING AND CRITICAL HABITAT DESIGNATION IN PROTECTING THREATENED AND ENDANGERED SPECIES

For species listed as threatened and endangered, the Act requires the Service to designate critical habitat to the maximum extent prudent and determinable. The Act defines critical habitat as the specific areas containing features essential to the conservation of a threatened or endangered species and that may require special management considerations or protection.

For listed species, section 7(a)(2) of the Act requires Federal agencies to consult with the Service in order to ensure that activities they fund, authorize, permit, or carry out are not likely to *jeopardize* the continued existence of the species. The implementing regulations define *jeopardy* as any action that would appreciably reduce the likelihood of both the survival and recovery of the species.

For the critical habitat of listed species, section 7(a)(2) further requires Federal agencies to consult with the Service to ensure that activities they fund, authorize, permit, or carry out do not result in destruction or *adverse modification* of critical habitat. *Adverse modification* of critical habitat is defined as any direct or indirect alteration that appreciably diminishes the value of critical habitat for the survival and recovery of the species.

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<sup>5</sup> **Note to Reader:** Readers who are already familiar with the Act may wish to skip this chapter and proceed to the next background-information chapters (Chapters IV and V), or to the economic analysis (Chapter VI).

As stated in the proposed rule, "... critical habitat also provides non-regulatory benefits to the species by informing the public [as well as land-managing agencies] of areas that are important for species recovery and where conservation actions would be most effective." "Critical habitat also identifies areas that may require special management considerations ... and may help provide protection to areas where significant threats to the species have been identified or help to avoid accidental damage to such areas."

## 2. CONSULTATION UNDER SECTION 7 OF THE ACT

As indicated above, section 7 of the Act requires Federal agencies to consult with the Service whenever activities they fund, authorize, or carry out may affect listed species or designated critical habitat. Section 7 consultation with the Service is designed to ensure that current or future Federal actions do not appreciably diminish the value of critical habitat for the survival and recovery of a listed species.

The Service has authority under section 7 to consult on activities on land owned by individuals, organizations, states, or local and tribal governments only if the activities on the land have a *Federal nexus*. A *Federal nexus* occurs when the activities require a Federal permit, license, or other authorization, or involve Federal funding. The Service does not have jurisdiction under section 7 to consult on activities occurring on non-Federal lands when the activities are not Federally funded, authorized, or carried out. In addition, consultation is not required for activities that do not affect listed species or their critical habitat.

When consultations concern activities on Federal lands, the relevant Federal Action agency initiates consultation with the Service. When an activity proposed by a state or local government or private entity requires a Federal permit or is Federally funded or carried out, the Federal agency with the *nexus* to the activity initiates consultation with the Service. For example, the Army Corps of Engineers is the agency that issues section 404 permits under the Clean Water Act, so it is the Action agency.

The consultation begins after the Federal Action agency determines that its action may affect one or more listed species or their designated critical habitat, even if the effects are expected to be beneficial since projects with overall beneficial effects could include some adverse impacts. Consultations are frequently conducted for multiple species if more than one species is affected by the action.

The consultation between the Federal Action agency and the Service may involve informal consultation, formal consultation in the case of adverse impacts, or both. Informal consultation may be initiated via a telephone call or letter from the Action agency, or a meeting between the Action agency and the Service. In preparing for an informal consultation, the Action agency compiles all the biological, technical, and legal information necessary to analyze the scope of the activity and discusses strategies to eliminate adverse effects on listed species or critical habitat. Through

informal discussions, the Service assists the Action agency and the Applicant, if any, in identifying and resolving potential conflicts at an early stage in the planning process, and may make recommendations, if appropriate, on ways to avoid adverse effects.

If during informal consultation the Federal Action agency determines that its action (as originally proposed or revised and taking into account direct and indirect effects) “is not likely to adversely affect” listed species or critical habitat (e.g., the effects are beneficial, insignificant or discountable), and the Service agrees with that determination, then the Service provides concurrence in writing and no further consultation is required.

But if the proposed action, as revised during informal consultation, is still likely to adversely affect listed species or critical habitat, the Action agency must request in writing initiation of formal consultation with the Service and submit a complete initiation package. Formal consultations, which are subject to specific timeframes, are conducted to determine whether a proposed action is likely to *jeopardize* the continued existence of a listed species or destroy or *adversely modify* designated critical habitat. This determination depends on the extent to which a project may affect the species. Many variables, including the project’s size, location and duration, may influence the extent of the impact and, in turn, the determination of a “may effect” opinion.

If the Service finds, in its biological opinion, that a proposed action is not likely to *jeopardize* the continued existence of a listed species, or destroy or *adversely modify* the critical habitat—even though the action may adversely affect listed species or critical habitat—then the action likely can be carried out without violating section 7(a)(2) of the Act.

On the other hand, if the Service finds that a proposed action is likely to *jeopardize* the continued existence of a listed species and/or destroy or *adversely modify* the critical habitat, then the Service provides the Action agency with reasonable and prudent alternatives that will keep the action below the threshold of *jeopardy* and/or *adverse modification*, if any can be identified.

The Service works with Action agencies and Applicants in developing reasonable and prudent alternatives. A reasonable and prudent alternative is one that (1) can be implemented in a manner consistent with the intended purpose of the action; (2) can be implemented consistent with the scope of the Action agency’s legal authority and jurisdiction; and (3) is economically and technologically feasible. The Service will, in most cases, defer to the Action agency’s expertise and judgment as to the feasibility of an alternative. Reasonable and prudent alternatives can vary from slight project modifications to extensive redesign or relocation of a project. Costs associated with implementing reasonable and prudent alternatives vary accordingly.



### **3. TAKING AND OTHER RESTRICTIONS OF THE ACT**

#### **3.a. Wildlife Species**

Regardless of any *Federal involvement* and critical habitat designation, once a species has been formally listed as threatened or endangered, it is entitled to certain regulatory protections under the Act. First and foremost, section 9 of the Act specifically prohibits the *taking* of any endangered species of fish or wildlife (the prohibition does not extend to plants). The term *take* is defined as "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or attempt to engage in any such conduct." The regulations at 50 CFR section 17.3 define harm to mean an act which actually kills or injures wildlife. In addition, endangered species, their parts or any products made from them may not be imported, exported, possessed or sold. Section 4(d) of the Act gives the Service regulatory discretion to extend the protections of section 9 to threatened species. Such an act may include significant habitat modification or degradation where it actually kills or injures wildlife by significantly impairing essential behavioral patterns, including breeding, feeding or sheltering.

However, the Act allows the Service to permit *take* by private applicants that would otherwise be prohibited, provided such *taking* is "incidental to, and not [for] the purpose of, the carrying out of an otherwise lawful activity." Section 10(a)(1)(B) of the Act allows non-Federal parties planning activities that have no *Federal nexus*, but which could result in the incidental *taking* of listed animals, to apply for an incidental *take* permit. The application must include a habitat conservation plan laying out the proposed actions, determining the effects of those actions on affected fish and wildlife species and their habitats (often including proposed or candidate species), and defining measures to minimize and mitigate adverse effects. The Service may elect to issue an incidental *take* permit if the incidental *take* is to be minimized by reasonable and prudent measures and implementing terms and conditions that are stipulated in the permit.

#### **3.b. Plant Species**

Section 9(a)(2) of the Act states that it is unlawful to remove and possess any endangered plant species from areas under Federal jurisdiction; maliciously damage or destroy any such species on any such area; or remove, cut, dig up, damage, or destroy any such species on any other area in knowing violation of any state law. In addition, endangered species, their parts or any products made from them may not be delivered, received, transported, shipped or sold in interstate or foreign commerce. As above, section 4(d) of the Act gives the Service regulatory discretion to extend the protections of section 9(a)(2) to threatened plant species.

However, the Service may give permission to remove a listed plant from areas under Federal jurisdiction, and may also give permission for actions that are otherwise prohibited by section 9 of the Act for "scientific purposes or to enhance the propagation or survival of the affected species



including, but not limited to, acts necessary for the establishment and maintenance of experimental populations.”

## **EXISTING PROTECTIONS<sup>6</sup>**

## **CHAPTER IV**

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In addition to the Act, other existing regulations and land-management programs protect Hawai'i's threatened and endangered species and their habitats. This chapter provides an overview of protections that are relevant to the cave animals and the Koloa area, including: other Federal programs, State land-use controls affecting public and private lands, county land-use controls, State protections for listed species, and land management by various public and private organizations. Land-use management that applies specifically to the proposed critical habitat is summarized in Table I-1. As appropriate, this information is used in Chapter VI to estimate the section 7 economic impacts and indirect economic impacts that occur over and above impacts attributable to existing protections.

### **1. FEDERAL SPECIES PROTECTIONS AND LAND MANAGEMENT**

#### **1.a. Conservation Partnerships Program, Pacific Islands Ecoregion**

The Service's Pacific Islands Fish and Wildlife Office's Conservation Partnerships Program is a collection of voluntary habitat restoration programs having the goal of restoring native Pacific Island ecosystems through collaborative projects with private landowners, community groups, conservation organizations, and other government agencies. The Program can provide cost-share funds, as well as information on habitat restoration techniques, native species, Safe Harbor Agreements, additional funding sources, required permits, and potential vendors of restoration services (fence contractors, nurseries, etc.). The Program is divided into five sections, discussed below.

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<sup>6</sup> **Note to Reader:** Readers already familiar with existing protections in Hawai'i of threatened and endangered species and their habitats may wish to skip this chapter and proceed to the approach to the analysis (Chapter V), or to the economic analysis (Chapter VI).

### **1.a.(1) Partners for Fish and Wildlife Program**

The Partners for Fish and Wildlife (PFW) Program is the Service's habitat restoration program for long-term conservation on private land. The PFW Program was established to offer technical and financial assistance to landowners who wish to restore wildlife habitat on their property. PFW Programs can include constructing fences to protect habitat; controlling alien species; restoring native ecosystem elements such as hydrology and micro-habitat conditions; and reintroducing native species.

The Service provides assistance ranging from informal advice on the location and design of potential restoration projects to cost-shared funding under a formal cooperative agreement with the landowner. If warranted, the Service also provides participating landowners with technical assistance to develop Safe Harbor Agreements that cover habitat managed for endangered or threatened species. The Agreements provide assurances to landowners that additional land, water, and/or restrictions on uses of natural resources will not be imposed as a result of their voluntary conservation actions.

Since funding is limited, projects given the highest priority are ones that manage or reestablish natural biological communities and provide long-term benefits to declining migratory bird and fish species, and species that are endangered, threatened, or proposed for listing; and projects on private lands that satisfy the needs of wildlife populations on National Wildlife Refuges.

### **1.a.(2) The Hawai'i Biodiversity Joint Venture**

The Hawai'i Biodiversity Joint Venture (HBJV) is a public-private effort to protect, maintain, improve, and restore the native biological diversity of the Hawaiian Islands. The mission is to work with others to conserve, protect, and enhance fish, wildlife, and plants and their habitats.

The HBJV was initiated with the following goals:

- Maintain natural communities and habitats for native species
- Support efforts to cooperatively manage significant native ecosystems on public and private land
- Develop natural resource management techniques to address widespread threats (such as feral ungulates, weeds, rats, and alien insects) to Hawai'i's native ecosystems
- Restore former wetlands, native forests and other natural communities on public and private lands
- Protect native Hawaiian ecosystems and natural communities through land and water acquisition and management.

Since funding is limited, priority is given to projects that: (1) implement management or research actions that directly contribute to protecting or restoring habitats for multiple endangered, threatened, candidate, or rare species; (2) address key threats to native ecosystems or habitats; and (3) benefit rare or unique ecosystems or habitats.

#### **1.a.(3) Pacific Islands Coastal Program**

The Pacific Islands Coastal Program identifies and conserves important coastal natural resources. The goals of the program are to:

- Identify and prioritize coastal natural resources and threats
- Implement on-the-ground projects in partnership with others
- Promote public stewardship of coastal fish, wildlife, plants and their habitats.

The objectives of the program include:

- Protecting and restoring coastal wetlands and uplands, anchialine pools, estuaries, coral reefs and streams
- Preventing and eradicating invasive alien species in coastal areas
- Protecting and restoring watersheds for native species' habitat needs
- Building public support through partnerships, education and community involvement
- Inventory and map coastal resources.

#### **1.a.(4) Endangered Species Landowner Incentive Program**

The Endangered Species Landowner Incentive Program is a focused effort to combine cost-share funds and regulatory relief incentives (Safe Harbor Agreements and Candidate Conservation Agreements with Assurances) to address high-priority habitat restoration needs of endangered, threatened and candidate species and species of concern.

#### **1.a.(5) Other Habitat Restoration Programs**

Other Habitat Restoration Programs include the National Coastal Wetlands Conservation Grant Program and the North American Wetlands Conservation Grant Program. In addition, the Conservation Partnerships Program seeks to provide a connection between habitat restoration projects and non-Service funding sources.

#### **1.b. Wildlife Habitat Incentives Program**

Under the Wildlife Habitat Incentives Program (WHIP), the Natural Resources Conservation Service (NRCS) of the U.S. Department of Agriculture (USDA) provides assistance to landowners

and lessees (leases must be for 5 years or more) to protect and restore Hawai'i's native habitats as well as habitats of threatened and endangered species. In Hawai'i, the focus is on the following habitats:

- Threatened/endangered plant species habitat
- Native forests/riparian areas adjacent or connected to a native forest reserve, wildlife refuge, or other preserved forest/riparian area
- Montane wetlands and bogs
- Coastal dunes that support rare plants, seabirds, monk seals or turtles
- Anchialine pools
- Endangered waterbird and migratory bird habitat
- Caves and rare species

The NRCS works with private landowners and lessees to help them develop a Wildlife Habitat Development Plan for their land that benefits native wildlife and meets other goals and objectives of WHIP. If the Plan is selected for funding, a 5- to 10-year contract is entered into whereby the landowner or lessee agrees to undertake wildlife habitat development practices such as noxious weed control, fencing, planting of native trees, and wetland restoration. In turn, NRCS reimburses the landowner or lessee 75 percent of the cost of carrying out these practices at specified rates. However, the funds cannot be used for mitigation of any kind, or on any land designated as converted wetland.

## **2. STATE LAND MANAGEMENT**

### **2.a. State Districting**

All lands in Hawai'i are allocated by the State into one of four districts: Conservation, Agricultural, Urban and Rural. The State, through its Department of Land and Natural Resources (DLNR) and its Board of Land and Natural Resources (the Board) has primary land-management responsibility for activities and development in the Conservation District, while the counties have primary responsibility in the Urban, Rural and Agricultural Districts.

### **2.b. The Conservation District**

The purpose of the Conservation District is to conserve, protect and preserve the State's important natural resources through appropriate management in order to promote the long-term sustainability of these natural resources, and to promote public health, safety and welfare (Hawai'i Revised Statutes (HRS) §183C). To this end, limited development and commercial activity is allowed in the Conservation District. "Important natural resources" include the watersheds that supply potable water and water for agriculture; natural ecosystems and sanctuaries of native flora and fauna, particularly those which are endangered; forest areas; scenic areas; significant historical,

cultural, archaeological, geological, mineral and volcanological features and sites; and other designated unique areas.

Permission is required to use land, construct facilities, or conduct many of the activities in the Conservation District (see below). Permits for routine uses or activities are issued by DLNR, while more complex activities or uses (such as certain construction projects and commercial operations) require formal approval of a Conservation District Use Application (CDUA) by the Board, and often require an approved management plan.

## **2.c. Conservation District Subzones**

All land in the Conservation District has been assigned to one of five subzones that reflect a hierarchy of uses from the most restrictive to the most permissive. These subzones are the Protective Subzone (the most restrictive), Limited, Resource, General and Special (HAR, Title 13, Chapter 5). Except for the Special Subzone, all uses and activities allowed in a more restrictive subzone in the hierarchy are allowed in the less restrictive subzones. The five subzones are described below.

### **2.c.(1) Protective Subzone**

The Protective Subzone, the most restrictive of the five subzones, was established to “... protect valuable resources in designated areas such as restricted watersheds ... plant and wildlife sanctuaries ... and other designated natural and unique areas.” Correspondingly, lands and waters generally included in this subzone are needed to protect watersheds, water sources, and water supplies; and to preserve the natural ecosystems of native plants and wildlife, particularly endangered species.

No structures, homes, or farm activities are allowed in the Protective Subzone, with two exceptions. First, the land can be used by State and county governments and by non-government entities that serve the public (e.g., the local utility companies) “for public purpose”—i.e., to fulfill mandated government functions for the public benefit such as transportation systems, water systems, and communications systems or recreational facilities. Second, Native Hawaiians owning *kuleana* land (land that was granted to Native-Hawaiian tenants in the mid-1800s) may use it for agriculture or single-family residences if their land was used “historically and customarily” for these purposes.

Allowed uses (by permit or Board approval) in the Protective Subzone include: replacing or reconstructing an existing structure and some types of accessory structures, habitat improvements for plant and wildlife sanctuaries, Natural Area Reserves, wilderness areas and scenic areas, limited removal of certain trees, and removal of noxious plants from small areas provided that the ground is not disturbed significantly. Limited landscaping is allowed, but is restricted to plants that are endemic or indigenous; alien subspecies are specifically prohibited.

### **2.c.(2) Limited Subzone**

The Limited Subzone encompasses areas that are potentially dangerous to the public due to possible flooding, soil erosion, *tsunami* (tidal waves), volcanic activity or landslides. Lands having a general slope of 40 percent or more are also included in this subzone. The purpose of the Limited Subzone is to limit uses where natural conditions suggest that human activity should be constrained.

In addition to what is permitted in the Protective Subzone, the following activities and uses are allowed in the Limited Subzone by permit or Board approval: accessory structures near existing structures; single-family homes (one per lot) if State and county regulations are followed; agricultural activities; facilities or devices used to control erosion, floods and other hazards; botanical gardens and private parks; landscaping; and removal of noxious plants in areas larger than 10,000 square feet that result in significant ground disturbance.

### **2.c.(3) Resource Subzone**

The Resource Subzone encompasses lands that are suitable for growing and harvesting commercial timber or other forest products, park land, and land for outdoor recreation (hunting, fishing, hiking, camping and picnicking, etc.). The purpose of the Resource Subzone is to develop properly managed areas to ensure the sustained use of Hawai'i's natural resources.

In addition to what is permitted in the Protective and Limited Subzones, the following activities and uses are allowed in the Resource Subzone by permit or Board approval: commercial forestry under an approved management plan, and mining and extraction of any material or natural resource.

### **2.c.(4) General Subzone**

The General Subzone is used to designate open space where special conservation uses may not yet be defined, but where urban uses may be premature. This subzone encompasses lands that may not be adaptable to or needed currently for urban, rural or agricultural use. The General Subzone also includes lands that are suitable for farming, flower gardening, nursery operations, orchards and grazing. Golf courses are not allowed.

In addition to what is permitted in the Protective, Limited and Resource Subzones, facilities necessary for the above-mentioned uses are allowed by permit when these facilities are compatible with the natural physical environment, and the use promotes natural open space and scenic value.

## **2.c.(5) Special Subzone**

Special Subzones are designated for educational, recreational and research purposes. These subzones set aside lands possessing unique developmental qualities that complement the natural resources of an area.

## **2.d. Cave Protections**

Act 241, passed by the 2002 Hawai'i state legislature and signed by the Governor on June 28, 2002, was enacted to protect the irreplaceable resources of cultural, spiritual, aesthetic and scientific value contained in Hawai'i's network of underground caves. Act 241 defines a cave as any naturally occurring void, cavity, recess, or system of interconnected passages large enough for human entry beneath the surface of the earth.

Act 241 prohibits destruction of a cave or any part of the interior of a cave without the owner's written consent. It also prohibits removing, killing, or harming any native or endemic organisms within a cave. However, the Act does not prohibit these activities if they occur during permitted construction activities, provided that cave protection mitigation measures disclosed through the environmental review under HRS §343 (mentioned below) and land-use permitting processes are adhered to. In addition, Act 241 does not prohibit or constrain surface activities on the land above a cave.

Act 241 also makes it unlawful for a person to store or dispose of garbage, dead animals, sewage, litter, or other toxic substances in any cave. As an exception to this rule, any cesspool or leachfield that existed prior to June 28, 2002 shall continue to be lawful as a nonconforming facility, provided the facility is not expanded or reconstructed. Act 241 also prohibits burning any material within a cave that may produce smoke that is harmful to naturally occurring organisms in the cave.

## **2.e. Archaeological Resource Protections**

Hawai'i's laws contain several protections for sites that contain archaeological resources. These protections are administered by the State Historic Preservation Office of DLNR.

### **2.e.(1) Archaeological Inventory Survey**

Any project having involvement (e.g., funding, permitting, land-use district change, etc.) from the State or its political subdivisions requires an archaeological inventory survey. The survey must cover the entire project area, including areas directly and indirectly affected by the project. The survey must evaluate the presence or absence of subsurface sites, and a report must be prepared that analyzes the significance of any surface or subsurface archaeological sites that are found (HAR §13-276).



## **2.e.(2) Burial Sites**

A burial site is defined as any site where human remains are found outside of a known cemetery and the remains appear to be over 50 years old. Lava tubes and caves were often used for burial sites before western contact in 1778 and at least 40 years afterwards. Obviously, burial caves have to be large enough for human entry.

In general, if a burial site is found during an archaeological survey, it is preserved in place. Any request to relocate human remains must be approved by the island burial council or by DLNR (HAR §13-300).

If a burial site is found inadvertently during construction, all activity within the area must stop until a determination is made as to whether the remains should be preserved on-site or relocated. Once a final burial site is agreed upon, it is likely to be restored, landscaped, have a buffer area established around it, and/or fenced (HAR §13-300).

## **3. STATE SPECIES PROTECTIONS**

### **3.a. Protection of Threatened and Endangered Wildlife and Ecosystems**

The State has established various laws and administrative rules to protect threatened and endangered wildlife and their ecosystems. The Administrative Rule “Indigenous Wildlife, Endangered and Threatened Wildlife, and Introduced Wild Birds,” implements a State act that was specifically designed to conserve, manage, protect and enhance indigenous wildlife, endangered and threatened wildlife, and introduced wild birds (HAR §13-124). The State list of threatened and endangered species includes by reference species on the Federal list.

With regard to threatened and endangered wildlife species, prohibited activities include *taking*, possessing, processing, selling, offering for sale, or transporting these species. Nor can their nests be removed, damaged or disturbed, or their young, eggs, dead body or skin be removed from the State of Hawai‘i. Nor does DLNR issue permits to destroy or otherwise control threatened or endangered species of wildlife or introduced wildlife. However, these rules do not apply to authorized employees of DLNR, the State Department of Agriculture, and the Service if the employees are acting in the course of their official duties. Also, “incidental *takes*” are allowed subject to approved habitat conservation plans and Safe Harbor Agreements (HRS §195D).

Similarly, the State has established various laws and Administrative Rules to protect threatened and endangered plants and their ecosystems, which in turn helps protect wildlife. The Administrative Rule “Threatened and Endangered Plants,” implements a State act that was specifically designed to conserve, manage, protect and enhance native threatened and endangered plants (HRS §195D). Prohibited activities include the *taking*, selling, delivering, carrying, shipping, transporting, or exporting of any native endangered or threatened plant. However, license holders

may sell such plants if the plants are garden-grown. And “incidental *takes*” are allowed subject to approved habitat conservation plans and Safe Harbor Agreements.

### **3.b. State Environmental Assessments and Environmental Impact Statements**

Hawai'i State law calls for efforts to prevent or eliminate damage to the environment and biosphere and to protect endangered species and indigenous plants and animals. To meet this and other goals, Hawai'i's Environmental Impact Statement (EIS) law (HRS §343), which is administered by the State Office of Environmental Quality Control (OEQC), requires that an Environmental Assessment (EA) and/or EIS be prepared for many development projects. “The law requires that government give systematic consideration to the environmental, social and economic consequences of proposed development projects before granting permits” for construction (OEQC, 1997). For impacts on biological resources, OEQC guidelines call for biological surveys, an ecosystem impact analysis, and proposed mitigating measures. The requirements and guidelines apply to development projects in the four State Agricultural, Urban, Rural and Conservation Districts.

## **4. COUNTY LAND MANAGEMENT**

While the State manages land in the Conservation District, the counties have primary management responsibility for land in the other three State Districts: Agricultural, Urban and Rural. Also, development along the shoreline is subject to county regulation, even for land in the Conservation District.

### **4.a. Agricultural District**

The Agricultural District includes “good” farm land and, from an agricultural perspective, land that is commonly referred to as “junk” land because it is unsuitable for farming or ranching. “Junk” land includes gulches, steep hillsides, rocky land and, on Maui and the Big Island, even relatively recent lava flows having little or no topsoil. This districting of “junk” land into the Agricultural District reflects the fact that this district is a catch-all category that includes all lands not otherwise categorized, regardless of the agricultural quality of the land.

Crops, livestock and grazing are permitted in the Agricultural District, as are accessory structures and farmhouses. Although land in the Agricultural District is not meant to be urbanized it is, in practice, sometimes used for large-lot subdivisions. On Kaua'i, most of these subdivisions are on former sugarcane land.

Listed species are found in some parts of the Agricultural District, particularly in gulches, on hillsides, and on some of the land that is used for low-intensity grazing. In many cases, the fact that the land is in the Agricultural District indirectly protects listed species by limiting urban sprawl.

**4.b. Urban and Rural Districts**

Land-use and development in the State Urban and Rural Districts are subject to county regulations, including the county general plan, community plans, zoning, and building code regulations.

Before developer-initiated changes to the county general plan or community plans are approved, developers are required to address the impacts of their projects on rare, threatened, or endangered species or their habitat, and mitigate any adverse impacts.

**4.c. Special Management Areas**

As mandated by Hawai'i Coastal Zone Management (CZM) program, counties have an additional layer of regulation that provides special controls on development in Special Management Areas (SMAs) located along the shoreline, even for land in the Conservation District (HRS §205A and Public Law 92-583). Most development in an SMA requires an SMA Use Permit from the county where the development is proposed.

The intent of the CZM program is to avoid the permanent loss of valuable resources and to ensure adequate access to beaches, recreation areas and natural reserves (HRS §205A). Two of the objectives are: (1) "Protect valuable coastal ecosystems ... from disruption and minimize adverse impacts on all coastal ecosystems"; and (2) "Promote the protection, use and development of ... coastal resources to assure their sustainability." Related policies are: (1) "Exercise an overall conservation ethic, and practice stewardship in the protection, use and development of ... coastal resources"; (2) "Preserve valuable coastal ecosystems ... of significant biological or economic importance"; and (3) "Ensure that the use and development of ... coastal resources are ecologically and environmentally sound and economically beneficial." Finally, two of the implementing guidelines state that (1) "No development shall be approved unless the authority has first found that the development will not have any substantial adverse environmental or ecological effect, except as such adverse effect is minimized to the extent practicable and clearly outweighed by public health, safety, or compelling public interests"; and (2) "The authority shall seek to minimize, where reasonable, any development which would adversely affect ... wildlife habitats."

## APPROACH TO THE ECONOMIC IMPACT ANALYSIS<sup>7</sup>

## CHAPTER V

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This chapter presents the approach used in Chapter VI to estimate the direct and indirect economic impacts of the section 7 listing and critical habitat provisions of the Act on projects, land uses and activities in proposed critical habitat for particular species. First, the scope of the economic analysis is described. This is followed by a discussion of the analytical concepts and steps used to conduct the analysis.

### 1. SCOPE OF THE ANALYSIS

The parameters below define the scope of the economic analysis.

#### **1.a. Time Horizon for the Analysis**

An 18-year time horizon is used because the county and many large landowners have specific plans for development up to the year 2020 but generally not beyond (see the *2000 Kaua'i General Plan*). In addition, the forecasts in this analysis of future economic activity are based on current socioeconomic trends and the current level of technology, both of which are likely to change significantly over the long term.

#### **1.b. Projects, Land Uses and Activities Subject to Analysis**

The analysis focuses primarily on the "reasonably foreseeable" projects, land uses, and activities that could affect the physical and biological features of the proposed critical habitat units. In turn, these are the activities that could be affected by the critical habitat designation.

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<sup>7</sup> **Note to Reader:** Readers who are already familiar with the approach to the analysis may wish to skip this chapter and proceed to the economic analysis in Chapter VI.

"Reasonably foreseeable" projects, land uses, and activities are defined for the purposes of this report as those which are (1) currently authorized, permitted, or funded; (2) proposed in plans currently available to the public; or (3) projected or likely to occur within the next 18 years based on (a) recent economic or land-use trends, development patterns, evolving technologies, competitive advantages, etc., and (b) limits imposed by land-use controls, access, terrain, infrastructure, and other restrictions on development. Current and future activities that could potentially result in section 7 consultations and/or project modifications are considered to be reasonably foreseeable.

## **2. ANALYTICAL CONCEPTS AND STEPS**

The approach used to estimate the economic impacts on specific projects, land uses and activities in areas proposed for critical habitat involved, as appropriate, the analytical concepts and steps described below.

### **2.a. Background Information**

In order to provide context for the analysis, and to the extent that information was reasonably available, background information was obtained on projects, land uses, and activities that may potentially be affected by the proposed designation. Depending upon the situation, this background information included some or all of the following: (1) the location of a project, land use, or activity; (2) a description of the project, land use, or activity, including its magnitude; (3) the amount of economic activity associated with the project, land use, or activity (e.g., revenues and employment); (4) past section 7 consultations, project modifications and associated costs; and (5) whether the project site is within the geographic area known to be *occupied* by listed species other than those in the current proposal.

### **2.b. Federal Involvement**

For the current and planned projects, land uses, and activities that may affect the physical and biological features of the proposed critical habitat units, the next step in the analysis was to determine *Federal involvement*. As discussed in Chapter III, Federal agencies must consult with the Service whenever an activity they fund, authorize, or carry out may affect designated critical habitat. When consultations concern an activity on Federal lands, the relevant Federal agency consults with the Service. When consultations involve an activity proposed by a State or local government or by a private entity, the Federal "Action agency" to the activity consults with the Service.

In practice, not every single project, land use, and activity that has a *Federal nexus* has been subject to section 7 consultation with the Service. Thus, the analysis was further confined to those projects, land uses, and activities which are, in practice, likely to be subject to consultation. This assessment was based on a review of past consultations, current practices, and the professional judgments of Service and other Federal agency staff.

Activities on State, County, municipal and private lands that do not have a *Federal nexus* (i.e., they do not involve Federal funding, a Federal permit, or other Federal actions) are not directly restricted by critical habitat designation. However, these projects may be indirectly affected by the designation of critical habitat, as discussed below. Therefore, these activities are addressed in the analysis.

#### **2.c. Exclusion of Man-Made Features and Structures**

In practice, the critical habitat provisions of section 7 do not apply to the operation and maintenance (O&M) of existing man-made features and structures because these features and structures normally do not contain, and are not likely to develop, any *primary constituent elements*. Examples of man-made features and structures include buildings, roads, aqueducts, telecommunications equipment, arboreta and gardens, and *heiau* (indigenous places of worship or shrines). As a result, O&M of man-made features and structures were not considered further in the analysis.

An equivalent interpretation is that existing man-made features and structures are unmapped holes that are within the boundaries of a critical habitat unit, but are not part of the unit.

#### **2.d. Existing Protections**

The next step in the analysis involved identifying the impacts on activities that were expected to result from existing protections unrelated to section 7 (e.g., other existing Federal, State, and County land-use controls and environmental protections). If some other existing statute, regulation, or policy limits or prohibits a project, land use, or activity, the economic impacts associated with those limitations or prohibitions are not attributable to section 7 listing provisions and/or critical habitat provisions. For example, State protections include land-use restrictions for activities in the State Conservation District and specific protections of threatened and endangered species and their ecosystems.

#### **2.e. Consultations and Project Modifications**

For current and planned projects, land uses, and activities that are likely to be subject to consultations under section 7 of the Act, the next step in the analysis was to estimate (1) the quantity and nature of the consultations (e.g., formal or informal); and (2) changes that are likely to occur in such items as project designs, schedules, land uses, activities and programs.

The estimates reflect the availability of information which, in many cases, was limited (e.g., the outcome of future consultations will not be known until they occur).

**2.f. Direct Economic Costs**

The next step in the analysis was to estimate the costs of consultations and the changes to projects, land uses and activities prompted by implementing the section 7 provisions. The types of economic costs that were considered included, but were not limited to, changes in revenues, costs, and property values.

In some cases, costs were described but were not quantified for one or more of the following reasons: (1) the economic impacts attributable to both the species listing and the critical habitat are expected to be small; (2) the probability that the impacts will occur is small; (3) the impacts are highly speculative; or (4) data needed to quantify impacts are not reasonably available.

**2.g. Indirect Costs**

As mentioned above, certain projects, land uses, and activities that are not subject to section 7 of the Act may still be impacted indirectly by the designation of critical habitat. This would occur if State and county officials, courts, landowners, buyers and sellers of land, potential project investors, lenders, environmental groups, and community groups were to treat projects, land uses, and activities in critical habitat differently than they would treat identical projects, land uses, and activities outside of critical habitat. Whenever possible, quantitative assessments of indirect costs were made. However, the magnitude of some impacts and/or the probability of occurrence are unknown. In these cases, the possible impacts were discussed qualitatively.

**2.h. Costs to Small Entities**

All of the entities directly and indirectly affected of the section 7 listing and critical habitat provisions of the Act were evaluated to determine which, if any, are considered a small entity by the U.S. Small Business Administration (SBA) standards. An analysis was then done to determine if a substantial number of small entities will be significantly impacted, according to SBA guidelines.

**2.i. Direct Economic Benefits**

The next step in the analysis was to estimate the benefits (e.g., species preservation) associated with the section 7 listing and critical habitat provisions. In most cases, a qualitative discussion of benefits is provided because (1) scientific studies are not available on the magnitude of environmental changes due to critical habitat, and (2) market prices or existing economic studies on which to base values are not available (e.g., the economic value of preserving certain species).

**2.j. Indirect Economic Benefits**

The final step in the analysis was to estimate the indirect benefits associated with the section 7 critical habitat provisions. In most cases, a qualitative discussion of benefits is provided because

(1) the probability that the indirect effect will occur is unknown, (2) scientific studies are not available on the magnitude of environmental changes due to critical habitat, and (3) market prices or existing economic studies on which to base values are not available.

### **3. SOURCES OF INFORMATION**

The approach described above relied primarily on information provided by the Service (GIS map overlays, acreage tables, public testimony, comment letters on prior critical habitat proposals, consultation files, etc.); the State Department of Business, Economic Development & Tourism; County planning and finance departments; other Federal, State and County agencies; public and private landowners and land managers; affected companies; and other interested parties. Public documents used included the proposed rule, *Hawai'i Revised Statutes* and *Hawai'i Administrative Rules* related to land use, *The State of Hawai'i Data Book*, applicable County land-use plans, and property tax data.



## ECONOMIC COSTS AND BENEFITS

## CHAPTER VI

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### 1. INTRODUCTION

As noted in the Preface, the Service may exclude an area from critical habitat designation if it determines that the benefits of excluding the area outweigh the benefits of inclusion. To aid in this determination, this chapter presents an analysis of the direct and indirect section 7-related economic costs and benefits associated with listing the cave animals as endangered species and with designating critical habitat for them. However, the Service cannot exclude an area if it determines that the exclusion will result in the extinction of the species.

In order to analyze the costs and benefits associated with the listing and with critical habitat, two separate scenarios are identified. These are:

- **Scenario 1: Baseline Development.** This scenario assumes that the cave animals are not listed as endangered, and no critical habitat has been designated for them. In this situation, caves that have historical or archaeological significance are protected under State law (Chapter IV). Any other caves that are found (e.g., during a construction project) may be avoided or filled. Mesocaverns enjoy no special protections.
- **Scenario 2: Listing and Critical Habitat.** This scenario assumes that the cave animals are listed as endangered species, and critical habitat has been designated. In this scenario, when there is *Federal involvement*, activities that will affect *occupied* caves and mesocaverns must be consulted on under section 7 of the Act. Federal agencies must enter into a section 7 consultation with the Service on any action that is likely to *jeopardize* the continued existence of the species. In addition, Federal agencies must also enter into a section 7 consultation with the Service on any action that may affect critical habitat to ensure it does not result in the destruction or *adverse modification* of the critical habitat.

As explained in Chapter V, the approach used in this economic analysis involves estimating (1) the total section 7-related economic costs and benefits (also referred to as economic impacts) of the cave animals listing and critical habitat designation; and (2) the total indirect costs and benefits of the cave animals listing and critical habitat designation. As a result, the analysis presents two types of estimates:

- **Total Direct Section 7 Costs and Benefits.** These estimates include the economic impacts that are likely to occur from implementing both the species listing and the critical habitat provisions of section 7. In other words, these estimates identify the change in section 7-related costs and benefits from the Baseline Development (Scenario 1) to the Listing and Critical Habitat scenario (Scenario 2).
- **Total Indirect Section 7 Costs and Benefits.** These estimates include the indirect economic impacts that are likely to occur from both the listing and the critical habitat designation. In other words, these estimates identify the change in indirect costs and benefits from the Baseline Development scenario (Scenario 1) to the Listing and Critical Habitat scenario (Scenario 2).

The remainder of this chapter includes the following sections: history and typical costs of section 7 consultations (Section 2); direct total section 7-related costs (Section 3); indirect costs (Section 4), impacts on small entities (Section 5), and benefits (Section 6). A summary of the direct and indirect costs and benefits is presented in Section 7. For some projects, land uses and activities, the proposed critical habitat designation may generate both direct and indirect costs, both costs and benefits, etc. In these cases, the analysis of economic impacts is split among two or more sections as appropriate.

## **2. HISTORY AND TYPICAL COSTS OF SECTION 7 CONSULTATIONS**

In order to provide a context for the analysis, this section gives a summary of the completed consultations and project modifications that involved one or both of the cave animals. It also presents the costs generally associated with section 7 consultations, biological surveys, and associated project modifications. This information is used in Section 3 below to estimate direct section 7-related economic costs.

### **2.a. History of Section 7 Consultations and Project Modifications**

Service records indicate that, from the time the cave animals were listed in January 2000 until critical habitat was proposed in 2002, the Service conducted no section 7 consultations for the cave animals. However, the Service did conduct three section 7 “conferences” after it published a proposed rule to list the cave animals as endangered species in December 1997. A conference is

similar to a consultation except that it deals with species that are proposed for listing but have not yet been listed. A brief discussion of these conferences follows:

- In August 1999, the Service conducted an internal conference regarding Partners for Fish and Wildlife (PFW) program funding for the Kiahuna Cave Project. The project involves sealing a cave entrance with a stone wall and steel grate to prevent unauthorized access. The Service determined that the project is designed to benefit the cave animals and their habitat so no adverse effects are anticipated.
- In August 1999, the Service conducted an internal conference regarding PFW program funding for the Kukui'ula Caves Project. The project involved sealing two cave entrances with gates to prevent unauthorized access. In addition, the private landowner agreed not to develop 8.3 acres of land above the caves and to plant native vegetation. The Service determined that the project is designed to benefit the cave animals and their habitat so no adverse effects are anticipated.
- In November 1999, the Service completed an informal conference with the U.S. Department of Transportation (DOT) regarding the construction of the Koloa-Poipu Bypass Road. During grading for the road, an *occupied* cave was discovered. The project representatives determined that the cave could be avoided with a minor realignment of the road. With this realignment, the Service agreed with DOT that the project was not likely to adversely affect the cave animals.

## **2.b. Section 7 Consultations, Biological Surveys, and Project Modifications**

### **2.b.(1) Focus of Consultations**

For the cave animals, the proposed rule indicates that future section 7 consultations will focus on projects, land uses, and activities that could directly or indirectly adversely affect the animals or critical habitat. These are explained in Chapter I but, in general, they involve closing the caves and providing surface vegetation above or near the caves or mesocaverns; avoiding soil disturbances that fill caves or mesocaverns, alter airflow or light penetration, or change the microclimate; and avoiding the introduction of species, diseases, toxins, chemicals, bio-control organisms, etc., that decrease the habitat value.

### **2.b.(2) Cost of a Consultation**

As discussed in Chapter III, participants in a consultation may include the Service, the Federal Applicant or Federal Action agency, and possibly a non-Federal applicant. Although the

Service does not charge fees for its consultations, participants in consultations normally spend time assembling information about the site and their proposed project or activity; preparing for one or more meetings; participating in meetings; arranging for biological surveys and any associated reports; and responding to correspondence and phone calls.

For three levels of complexity (“Low”, “Medium” or “High”), Table VI-1 gives the estimated cost to those participating in consultations with the Service. The estimate is based on: (1) a review of consultation records across the country related to other critical habitat rulemakings; (2) the typical amount of time spent by all participants; and (3) the relevant standard hourly rates and overhead allowances for the Service, other Federal agencies, and private applicants in Hawai'i.

<b>Table VI-I</b> <b>ESTIMATED COST OF A SECTION 7 CONSULTATION</b>			
<b>Item</b>	<b>Low</b>	<b>Medium</b>	<b>High</b>
<b>Consultation</b>			
Federal Action Agency or Federal Applicant	\$2,200	\$6,400	\$10,700
U.S. Fish and Wildlife Service	\$1,600	\$5,100	\$10,000
<b>Total for Federal Agencies</b>	<b>\$3,800</b>	<b>\$11,500</b>	<b>\$20,700</b>
Non-Federal Applicant (if any)	\$1,400	\$4,200	\$8,200
<b>Total (if a Non-Federal Applicant)</b>	<b>\$5,200</b>	<b>\$15,700</b>	<b>\$28,900</b>
<b>Source:</b> Project consultants and U.S. Office of Personnel Management, 2002 General Schedule Salary Table.			

As indicated in the table, consultation costs could range from as little as \$3,800 to as much as \$20,700 if just Federal agencies are involved, and from \$5,200 to \$28,900 if there is a non-Federal applicant.

### **2.b.(3) Cost of Biological Survey**

The cost of a biological survey for a particular parcel and a technical report on the findings vary according to a number of parameters:<sup>8</sup>

- Size of the parcel: Most future projects in the proposed critical habitat will fall within one of three size categories: small (less than 10 acres), medium

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<sup>8</sup> This discussion refers to surface caves only, not all caves.

(11-100 acres), or large (101-300 acres). Large parcels take longer to survey, so the survey costs are higher.

- Number of caves: The number of caves in a parcel will depend on the location and geology of the parcel. A scientist familiar with caves in the Koloa region roughly estimates that an average 100-acre parcel will have from zero to three caves sites on it, with an average of two (Bishop Museum, 2002). This estimate is consistent with the number of caves found during an archaeological survey of the Kukui'ula planned development: seven caves were found on a 358-acre site (Cultural Surveys Hawai'i, 2001). Using the mid-ranges of the parcel sizes (i.e., 5 acres, 50 acres, and 150 acres), and the estimate of two caves per 100 acres, a small parcel will have zero cave sites ( $5 \text{ acres} \times 2 \text{ caves} \div 100 \text{ acres} = \sim 0$ ); a medium parcel will have one cave site ( $50 \times 2 \div 100$ ), and a large parcel will have three cave sites ( $150 \times 2 \div 100$ ).

Based on these parameters, estimates of the cost of surveying parcels with different combinations of features and to prepare the report on the findings are presented below. The estimates assume the following: (1) a two-person team can survey 100 acres in two days; (2) each cave site will require a half-day to survey when it is found, a half-day to survey on a follow-up visit several months later, and one day for writing the survey report; (3) biologist and field-assistant services are \$480 to \$1,000 per day; (4) travel costs for a two-person survey team for initial survey and follow-up surveys are \$500 to \$2,400, depending on number of trips (includes round-trip airfare from O'ahu, car rental, and per diem); (5) laboratory time equal to half the time spent in the field (Bishop Museum, 2002).

Based on these assumptions, the cost of surveying a typical small parcel with no cave sites is \$2,000; a medium parcel with one cave site is \$6,300; and a large parcel with three cave sites is \$11,400. Depending upon the size and number of caves, as well as on other characteristics, certain projects may require more or less survey effort than the average used in the cost estimates.

#### **2.b.(4) Costs of Project Modifications**

During the section 7 consultation process, the Service, a Federal Action agency, and/or a non-Federal applicant may suggest certain modifications to a proposed project in order to minimize the potential adverse impacts to the cave animals. Based on the limited consultation history and the biological needs of the species, most project modifications will involve sealing and preserving the caves, surface landscaping, and modifications to construction techniques (Service, 2002). The costs of project modifications are discussed below.

### Landscaping Project Modifications

Native plants recommended by the Service for landscaping in cave animal critical habitat include, but are not limited to, 'ohi'a (*Metrosideros polymorpha*), maiapilo (*Capparis sandwichiana*), 'a'ali'i (*Dononea viscosa*), wiliwili (*Erthrina sandwicensis*), and ilima (*Sida fallax*).

The economic impact of this project modification is the cost of landscaping with native vegetation over and above the cost of landscaping with whatever the project representative had planned originally. If the project representative originally planned to landscape with native vegetation, the cost is zero.

Local landscapers indicate that landscaping with native vegetation will cost about the same as landscaping with non-native vegetation (Kaua'i Nursery and Landscaping, No Ka Oi Plants, Lehua Lena Nursery, 2002). However, some native plants are not currently available in Kaua'i nurseries, so there would be an added cost to import them from nurseries on the Island of Hawai'i (the Big Island). However, over the long term, if sufficient demand exists for native plants on Kaua'i, the nurseries are likely to supply them at no added cost.

For each acre of landscaping in critical habitat, it will cost between \$3,200 and \$6,600 to import native plants from nurseries on the Big Island. This estimate is based on the: (1) number of plants typically used to landscape one acre with ground cover, shrubs, and trees; (2) size and weight of each type of plant; (3) shipping fees for inter-island ocean transport; and (4) handling fees to drop off and pick up the plants from the ports. This information is used to estimate the landscaping project modification costs for each type of project, land use, and activity presented below.

### Project Modifications to Preserve Caves Found During Biological Surveys

Caves that open to the surface are usually found during biological surveys before construction activities begin. As soon as a cave is discovered, it should be surveyed for the endangered cave animals by a biologist familiar with the cave animals. The biologist will want to return to Kaua'i to conduct a follow-up survey of the cave before construction begins. The cost for both the initial and the follow-up surveys are included in the biological survey cost-estimates in the previous subsection, so they are not considered part of the project modification costs.

For large caves found during biological surveys, the Service recommends that a tamper-resistant steel grate be installed, and the remaining openings to the cave be sealed with cement, rock, or other building materials to restore the natural airflow and humid conditions in the cave. This will restrict unauthorized access while still allowing biologists and archaeologists to enter the cave. The Service also recommends that the area above the cave, and a buffer zone around it, be safeguarded and planted with native vegetation to enhance the value of the habitat for the cave animals.

The cost of installing gates and sealing the remaining cave openings, has been partially supported by the Service in the past. Based on the budgets of two cooperative agreements between the Service and private landowners, the cost of closing a single cave ranges from \$4,500 to \$5,000 for materials, construction costs, and transportation. In both cases, the Service provided this funding. The private landowner was in charge of coordinating and planning the construction, obtaining the necessary permits, and providing certain in-kind services such as water or labor. Assuming these costs to the landowner are roughly similar to the amounts provided by the Service, the total cost to restrict unauthorized access to a cave is approximately \$10,000.

With regard to the cost of planting native vegetation, the U.S. Department of Agriculture (USDA) National Resources Conservation Service (NRCS) has recently agreed to fund 75 percent of two private revegetation projects for the areas above three caves in the proposed critical habitat through the Wildlife Habitat Incentives Program (WHIP) (Chapter IV). The project includes removing invasive weeds, fencing around the footprint of the caves and their buffer zones, and planting native vegetation and irrigating it. The revegetated area will amount to approximately 1 acre for one project, and 1.5 acres for the other. Since these projects have not been completed, the total cost is unknown. However, NRCS has agreed to provide up to \$10,000 for each project, which suggests that the expected cost of each project will be at least \$13,333 ( $0.75 \times \$13,333$ ) (NRCS, 2002). Since three caves will be protected during the two projects discussed above, the average cost per cave is approximately \$9,000. The cost of revegetating caves will depend upon on the size and location of the caves, so the expected revegetation cost per cave will range from \$5,000 to \$15,000.

Assuming that an average of 2 surface caves are found per 100 acres (Section 2.b.(3)), the expected cost of installing tamper-resistant steel grates, sealing the cave, securing, and revegetating the area averages about \$300 to \$500 per acre ( $\$10,000 + \$5,000 = \$15,000 \times 2 \text{ caves}/100 \text{ acres}$ ,  $\$10,000 + \$15,000 = \$25,000 \times 2 \text{ caves}/100 \text{ acres}$ ).

#### Project Modifications to Preserve Caves Found During Construction

For structural and safety reasons, buildings or roads are not likely to be constructed over large caves that can be discovered with test borings. However, some caves may become exposed during construction.

As soon as a large cave is discovered, work should stop on a project and the Service contacted so that the cave can be surveyed by a biologist familiar with the cave animals. Based on the parameters outlined in the section above on Biological Surveys, the cost to conduct an initial and follow-up survey is \$4,100 per cave. Any cave that is discovered during construction will also have to be surveyed for historical and archaeological artifacts. Since a biological survey could be done at the same time, it is not likely to delay the project construction.

The Service may recommend that any new openings to the cave be resealed to restore the natural airflow and humidity conditions to the cave. However, developers and project managers will

generally seal any new openings to large caves for safety reasons. Smaller caves are likely to be sealed as areas are paved, covered with foundations, or backfilled. Since the cost of sealing caves are generally part of construction projects, it is not considered a project modification cost.

As with caves found during a biological survey, the Service will recommend that native vegetation be planted above any caves found during construction. As mentioned above, the expected revegetation cost per cave will range from \$5,000 to \$15,000.

It is conservatively assumed that, on average, three to six new caves will be found during grading of a 100-acre site.<sup>9</sup> For example, a cave was discovered during construction for the Koloa Bypass Road, which involved grading roughly 30 acres in the proposed critical habitat. Using this assumption, the expected cost of surveying and revegetating the area above caves averages about \$270 to \$1,150 per acre ( $\$4,100 + \$5,000 = \$9,100 \times 3 \text{ caves} \div 100 \text{ acres}$ ,  $\$4,100 + \$15,000 = \$19,100 \times 6 \text{ caves} \div 100 \text{ acres}$ ).

## **2.b.(5) Construction Techniques**

### Land Preparation for Construction

Land preparation for slab foundations and roads typically involve test borings so construction over large caves can be avoided. The above-ground vegetation and underground roots at the site are removed and the site is graded. And to make sure the structure is on a solid footing, the caves and mesocaverns are crushed and the soil compacted. For a building structure, the perimeter and lines for utilities (plumbing, electricity phone, and cable TV) are trenched. Finally, a concrete slab or asphalt is laid on top of the site.

Removing above-ground vegetation and underground roots, grading, crushing caves, and trenching are all activities that destroy the *primary constituent elements* for the cave animals. Therefore, as a result of a section 7 consultation, alternative construction techniques may have to be used to avoid or minimize adverse impacts.

### Post-and-Pier Construction

One technique that is common in Hawai'i is post-and-pier construction, which involves digging several small holes and compacting the bottom of them to make sure the underlying rock will not settle. Then concrete posts are poured or placed in the holes. A pier-type foundation is built on top of the posts, usually leaving a crawl space between the ground surface and the underside of

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<sup>9</sup> This estimate of caves is higher than the previously assumed number discussed in Section 2.b.(3)—i.e., two per 100 acres—because this estimate takes into account additional caves without surface opening that may be found during grading.



the foundation, and space for utility lines. This type of construction is used often in Hawai'i because it allows easy access to the utilities under the building, reduces the number of points ground termites can access wood in the building, and typically does not involve extra costs.

Using post-and-pier construction will minimize the destruction of caves and mesocaverns since only the areas underneath the posts will be compacted. In addition, the roots from the vegetation will not have to be removed. However, post-and-pier construction can only be used for comparatively light-weight buildings.

#### Post-Tension Concrete Slabs (PT-Slabs)

Another construction technique is to post-tension concrete slabs (PT-slabs), which are somewhat thicker than regular concrete slabs, and contain tensioned cables inside the concrete. After the concrete has hardened for several days, the cables are put in tension with hydraulic jacks. This distributes the load throughout the slab and reduces cracking because the concrete is under tension; fewer cracks also limit termite access to the building. Utility lines can be placed between the walls instead of under the slab.

In order to pour PT-slabs, the ground surface must be cleared to remove loose rubble and surface vegetation; a protective membrane laid on the ground, then filled with construction gravel to level the surface. However, deeper roots can be left in the ground, and smaller underground caves need not be crushed because the PT-slab effectively "floats" over the ground and bridges smaller caves and mesocaverns. PT-concrete can be used for single-family homes or large multi-story buildings. Because of less ground preparation, PT-concrete can cost less than a standard slab foundation.

Similar technology, referred to as PT-concrete can also be used in road construction, but it is typically more expensive than asphalt paving.

#### **2.b.(6) Conservation Purchases, Land Set-Asides, and Other Project Modifications**

For most threatened and endangered species, project modifications include land set-asides and purchases of conservation land elsewhere within the critical habitat. In the case of the cave animals, however, the Service does not anticipate land set-asides and purchases because it is so difficult to determine whether an area (in the critical habitat) is *occupied* by the cave animals. Similarly, it is almost impossible to determine which areas are important to the movement and survival of the cave animals.

Furthermore, some projects, land-uses, and activities may require project modifications unique to the cave animals. When applicable, these project modifications are described below.

### 3. DIRECT SECTION 7-RELATED COSTS

The following analysis of direct section 7-related costs addresses ongoing land-use activities in the proposed critical habitat, but excludes certain areas and man-made features and structures that are not considered to be part of the proposed critical habitat because they do not contain the *primary constituent elements* for the cave animals (see Chapter I). The analysis also addresses foreseeable developments and major land-use changes in the proposed critical habitat.

#### **3.a. Conservation Programs**

The Partners for Fish and Wildlife (PFW) program is the Service's habitat restoration program for long-term conservation on private land. The Service provides assistance ranging from informal advice on the location and design of potential restoration projects to cost-shared funding under a formal cooperative agreement with landowners. Additional information about the PFW program appears in Chapter IV.

The Service has already completed two informal internal section 7 conferences on PFW programs concerning the closure of cave openings on private land in the proposed critical habitat. In the future, the Service would like to enter into a similar agreement with Grove Farm Company, Incorporated (Grove Farm) regarding caves in the western portion of the critical habitat.

Potential Project or Activity, next 18 years: One PFW conservation agreement

Federal Involvement: Partial funding from the Service

#### **Consultations and Costs**

Possible informal internal Service consultation. The private landowner may be involved.

- Total Section 7 Costs: \$15,600

Estimate is based on (1) one PFW conservation agreement in the next 18 years, (2) Low cost (from Table VI-1) of a consultation with a non-Federal agency as the Applicant, and (3) one biological survey of a large parcel of land to identify cave locations in addition to the ones that are already known.

Anticipated Project Modifications and Costs: None

Since the consultation will be conducted on restoration projects designed by the Service, the likely outcome of the consultation is that the project will promote conservation of the species, and will not adversely affect the cave animals or other listed species. Therefore no project modifications are anticipated.

Potential Entities Impacted:

*Federal:* Service

*Private:* Grove Farm

**3.b. Farming and Ranching Operations**

The proposed critical habitat includes approximately 3,096 acres of land in the Agricultural District. Much of the agricultural land in Unit 1a is in diversified agriculture, such as seed corn, coffee, dry-land taro and grazing.

Activities associated with farming and ranching that could affect the cave animals typically include plowing, planting, fertilizing, harvesting, applying pesticides and other chemicals, and maintaining irrigation systems and fences. The majority of these farming and ranching operations do not have *Federal involvement* and will not be directly impacted by the proposed critical habitat designation for the cave animals.

Nevertheless, some farmers and ranchers may participate in farm loan and disaster relief programs sponsored by the USDA NRCS and the Farm Services Agency (FSA). USDA farm loan programs and soil and water conservation programs are discussed in this section. USDA disaster relief programs are discussed later in the section on Natural Disasters.

Potential indirect impacts on the activities associated with farming and ranching are discussed in Section 4 below.

**3.b.(1) FSA Farm Loan Programs**

The FSA offers direct and guaranteed loans to farmers and ranchers who are temporarily unable to obtain private, commercial credit. Under the guaranteed loan program, FSA guarantees loans made by conventional agricultural lenders for up to 95 percent of the principal loan amount. The FSA also offers a direct loan program.

The two main types of loans available under both the guaranteed-loan and direct-loan programs are Farm Ownership loans and Farm Operating loans:

- **Farm Ownership Loans** may be used to purchase farmland, construct or repair buildings and other fixtures, develop farmland to promote soil and water conservation, or refinance debt. In order to qualify for this loan or loan guarantee, the farmer or rancher must own the farmland.

- **Farm Operating Loans** may be used to purchase livestock, farm equipment, feed, seed, fuel, farm chemicals, insurance, and other operating expenses; fund minor improvements to buildings; fund water development and family subsistence; and refinance debts. The farmer or rancher need not own the land.

Grove Farm owns nearly all of the land in the proposed critical habitat that is in the Agricultural District and that is actively used for farming or ranching. They lease their land out to smaller operators. Grove Farm is not likely to apply for a Farm Ownership loan because is a large business and has access to several credit sources. The small farmers and ranchers on the Grove Farm land do not qualify for Farm Ownership loans because they do not own the land. This arrangement is not likely to change in the future, so it is assumed that any future FSA loans or loans guarantees in critical habitat will be Farm Operating loans.

Historically, HSA has provided farm loans and loan guarantees to an average of four borrowers per year on Kaua'i (FSA, 2002). If this continues, than approximately 72 additional borrowers will receive FSA loans or loan guarantees over the next 18 years ( $18 \times 4$ ). However, the number of small farmers and ranchers on Kaua'i may increase as they convert some of the fallowed sugarcane land to diversified crops. If the average number of borrowers per year doubles, then about 144 additional borrowers will receive FSA loans or loan guarantees over the next 18 years ( $18 \times 8$ ).

In 2000, Kaua'i Island had approximately 139,482 acres in the Agricultural District. The proposed critical habitat contains approximately 3,096 acres in the Agricultural District, or 2.2 percent of the island-wide total. Assuming the number of FSA farm-loan borrowers are evenly distributed across the island's agricultural land, two to three borrowers will farm in the proposed critical habitat over the next 18 years ( $0.02 \times 72$ ; and  $0.02 \times 144$ ).

Potential Project or Activity, next 18 years: FSA Farm Operating loans and loan guarantees

Federal Involvement: FSA funding or oversight

#### Consultations and Costs

FSA indicates that for direct loans, individual farmers and ranchers will be included in the section 7 consultation process and, for loan guarantees, the lending agency will be included in the consultation.

- Total Section 7 Costs: \$23,000 to \$34,500

Estimate is based on the following: (1) two to three FSA Farm Operating loans or loan guarantees over the next 18 year; (2) Low cost (from Table VI-1) of a consultation with a non-

Federal agency as the Applicant; and (3) two to three biological surveys of medium-sized parcels of land.

Anticipated Project Modifications and Costs:

- Total Section 7 Costs: Minor

FSA Farm Operating loans and loan guarantees in critical habitat will be used by either farmers or ranchers. In general, ranching activities will not adversely affect the cave animals or their critical habitat. So, if all future loans and loan guarantees in critical habitat are used to support ranching, no project modifications are anticipated.

On the other hand, potential project modifications for farmers include reducing the use of insecticides and other chemicals that could enter the soil and harm the cave animals (Service, 2002). These modifications might increase farmers' costs and/or reduce their yields. However, Service guidelines state that project modifications must be economically and technically feasible (Service, 1998). Since the profit margins for farmers that qualify for FSA Farm Operating loans are typically small, the total economic impact is not likely to be great.

Potential Entities Impacted:

*Federal:* Service, FSA

*Private:* Two to three farmers

**3.b.(2) USDA Conservation Programs**

Some farmers and ranchers may seek Federal funding for soil and water conservation projects from NRCS and the FSA. Programs that are applicable to the agricultural land in the proposed critical habitat are described briefly below.

- **Environmental Quality Incentives Program (EQIP):** The intent of this program is to address problems with soil, water, and related natural resources. Projects are most likely to be funded if they address a significant statewide concerns such as animal waste management, sediment in runoff, and noxious weed control. Examples include planting a cover crop to reduce erosion, building a firebreak, and converting from a trench to a pipe-fed sprinkler irrigation system.
- **Wildlife Habitat Incentives Program (WHIP):** The intent of this program is to restore and enhance wildlife habitat, particularly for native species. Projects are more likely to be funded if they are within critical habitat. Examples include planting native species, protecting caves, and protecting

near-shore environments. (As mentioned in Section 2 above, two WHIP projects to plant native plants above *occupied* caves are currently underway).

- **Wetland Restoration Program (WRP):** The intent of this program is to restore, enhance, and/or develop wetlands on agricultural lands. Since there are no naturally occurring wetlands within the proposed critical habitat, only projects designed to develop wetlands are eligible for Federal funding.
- **Conservation Reserve Program (CRP):** This program allows landowners and producers who have highly erodible cropland or marginal pasture land to return the land to conservation use. Projects are most likely to be funded if they reduce erosion, improve water quality, and improve wildlife habitat. Projects typically include planting trees or grass on cropland.

Over the past 5 years in Kaua'i County, one farmer or rancher has received funding under the CRP, ten under EQIP, and thirteen under other agricultural conservation programs (Environmental Working Group, 2002). One or two projects over the past 5 years were initiated in the proposed critical habitat for the cave animals, but were cancelled before the conservation work was initiated (NRCS, 2002).

Assuming that the number of farmers and ranchers in the critical habitat who apply for Federal funding stays constant (i.e., one to two over 5 years), then four to seven farmers will apply for Federal funding over the next 18 years ( $1 \div 5 \times 18$ ;  $2 \div 5 \times 18$ ). The annual number of recipients may increase, however, due to increased funding and more inclusive criteria outlined in the 2002 Farm Bill (NRCS, 2002). Assuming that the rate doubles, eight to 14 farmers and ranchers will receive Federal funding in the proposed critical habitat over the next 18 years.

These projects are not expected to adversely affect the cave animals or their habitat because they are designed to reduce pollution, runoff, and pesticide use; manage non-native weed growth; enhance wildlife habitats; and conserve soil and water resources (NRCS, 2002). Nevertheless, NRCS intends to initiate an informal section 7 consultation with the Service to confirm that the Service concurs with this view.

Potential Project or Activity, next 18 years: NRCS and FSA conservation projects

Federal Involvement: Partial USDA funding

#### Consultations and Costs

Individual farmers and ranchers are notified about the consultations but are generally not involved in the consultation process for conservation projects (NRCS, FSA, 2002).

- Total Section 7 Costs: \$92,000 to \$161,000

Estimate is based on (1) eight to 14 conservation projects over the next 18 years, (2) Low cost (from Table VI-1) of a consultation with a Federal agency as the Applicant, and (3) eight to 14 biological surveys of medium-sized parcels of land.

Anticipated Project Modifications and Costs: None

In general, NRCS and FSA conservation projects are designed to reduce soil erosion, conserve water, and enhance wildlife habitat. These kinds of projects benefit the cave animals since they can reduce sedimentation in caves and promote the use of native vegetation above caves, so no project modifications are anticipated.

The only type of Federally funded conservation project that could potentially affect the cave animals would be the installation of an underground irrigation system. However, underground irrigation pipes are usually placed in existing irrigation ditches and then covered over (NRCS, 2002). Thus, no project modifications are anticipated

Potential Entities Impacted:

*Federal:* Service, NRCS, FSA

**3.c. Mining and Quarrying Operations**

Unit 1a surrounds a historical mining and quarrying operation and another active one. A cinder pit at Pu'u Hunihuni and limestone quarry are about 1.2 miles from Po'ipu along the Maha'ulepu shoreline. The cinder pit has not been used for many years and there are no plans for future use. The limestone quarry is currently being mined (Grove Farm, 2002). Although the previously disturbed areas of both the cinder pit and quarry are excluded from critical habitat, all the land immediately adjacent to it is within the critical habitat.

The current operations of the limestone quarry include drilling and blasting the large limestone deposits, using heavy equipment to remove the loosened rocks, loading the rocks into a crushing machine, and crushing the rocks into varying grades of sand and gravel. A large sinkhole (about 30 feet deep and 100 feet wide) is southeast of the quarry, and a small *occupied* cave is near the sink hole. Grove Farm has set up an internal boundary and has an informal agreement with archaeological groups to not disturb the sinkhole or associated caves (Jas W. Glover, Inc, 2002). With this agreement, the continued operation of the existing quarry will not be impacted by critical habitat.

Potential Project or Activity, next 18 years: Expansion of mining activities to a new quarry site

In anticipation of the future need for limestone and basalt on Kaua'i, Grove Farm has obtained county permits for a new quarry site about a mile northeast of the existing quarry. Development is planned in the next 5 to 10 years. This area was selected because it contains both basalt and limestone deposits (Grove Farm). Approximately half the 42-acres planned for limestone quarrying at the new site overlaps proposed critical habitat Unit 3.

Federal Involvement: Potential U.S. Environmental Protection Agency (EPA) involvement

The expansion of the quarry into a new site may require a National Pollutant Discharge Elimination System (NPDES) permit. The Hawai'i Department of Health (DOH) is delegated by the EPA to administer the NPDES program in Hawai'i. Historically, the EPA rarely becomes involved in the NPDES program, and it has been even more rare for the EPA to consult with the Service on NPDES permits. However, critical habitat designation could increase the likelihood that the EPA will consult with the Service. As a conservative estimate (i.e., more likely to overstate than understate the number of future consultations), it is assumed that the EPA will become involved when operations begin at the planned limestone and basalt quarry expansion site.

Consultations and Costs

- Total Section 7 Costs: \$22,000

Estimate is based on (1) one consultation in the next 18 years, (2) Medium cost (from Table VI-1) of a consultation with a non-Federal agency as the Applicant, and (3) one biological survey of a medium parcel of land to identify cave locations in the project site.

Anticipated Project Modifications and Costs:

- Total Section 7 Costs: \$8.7 to \$10.8 million plus substantial ripple effects (worst-case)

As explained in Chapter I, limestone deposits produce more and smaller caves than do lava flows. Much of the limestone in the proposed critical habitat that is planned for quarrying will support caves and mesocaverns (Geolabs, Inc., 2002). Removing it by blasting or by other techniques will clearly destroy the caves and mesocaverns.

A possible project modification would be to request Grove Farm to increase the quality of the critical habitat outside the planned quarry site by planting native vegetation and providing a conservation easement to nearby areas in critical habitat. Grove Farm may not agree to this, however, because they plan to develop the areas near the quarry site. In order to avoid *adverse modification* of critical habitat and the costs associated with a formal consultation, Grove Farm may



withdraw its plans to quarry limestone in the critical habitat. This would reduce the area planned for limestone mining by approximately 21 acres, or half the total area of their quarrying permit.

If a biological survey conducted as part of a section 7 consultation reveals cave animals in the limestone deposits on Grove Farm land outside the critical habitat, Grove Farm may not be able to quarry any of the 42-acre site without *taking* cave animals.

#### Project Modifications: Worst-Case Scenario

Almost all of the known limestone deposits in the area are in the proposed critical habitat (Stearns, 1966). A worst-case-scenario is that Grove Farm will lose all the potential revenues associated with future limestone quarrying on Kaua'i.

Sales from the current limestone operation have varied between \$2 million and \$4 million per year, depending upon economic activity on the island (Grove Farm). At one time, limestone was used by the sugar plantations to fertilize fields and harden cane-haul roads, but four of the five sugar plantations on Kaua'i shut down recently, and this segment of the market is smaller. However, limestone is used in concrete and other construction and landscaping materials, and Grove Farm expects to supply most of the island's future aggregate and sand needs. With growth in the construction industry fueled by tourism, the market is expected to remain strong. Thus, it is assumed that demand for limestone will stay about the same.

In the next 5 to 10 years, Grove Farm intends to move its quarrying operations to the new site. Assuming operations at the new site begin in 2007, and annual revenues range from \$2 to \$4 million, the total revenues for the time frame of this analysis will range from \$26 to \$52 million (\$2 million x 13 years and \$4 million x 13 years). According to the Hawai'i 1997 Input-Output Model, proprietors income in the mining industry is typically 8 percent of output, so Grove Farm stands to lose between \$208,000 and \$416,000 in income between 2007 and 2020.

There are no other permitted limestone quarries on Kaua'i (Jas W. Glover, Ltd., 2002). A geology map of Kaua'i shows there is one more large limestone deposit on the west side of the island, but development of a quarry at this site may be infeasible because of its proximity to Barking Sands State Park and its relatively difficult access (Stearns, 1966). Assuming this site is not developed, limestone production on Kaua'i could drop to zero.

Current limestone quarrying on Kaua'i employs three to four people. These jobs may be lost, along with potential job losses in the sectors that support limestone quarrying. However, a larger economic impact on Kaua'i will be the increased cost of concrete, since the limestone will have to be shipped in from O'ahu. Current inter-island ocean transport rates for limestone are \$13 to \$16 per ton, plus loading and unloading fees (Young Brothers, 2002). The current limestone quarry on Kaua'i produces about 50,000 tons of limestone sand and gravel per year (Jas W. Glover, Ltd.,

2002). Assuming demand remains constant, limestone consumers on Kaua'i will have to pay an additional \$650,000 to \$800,000 per year in shipping costs (\$13 x 50,000 and \$16 x 50,000). Between 2007 and 2020, the total increase in cost will be \$8.5 to \$10.4 million (13 years x \$650,000 and 13 years x \$800,000).

This increase in cost will primarily affect the companies that make concrete, but they can be expected to pass the cost increase on to concrete consumers. In turn, this may increase construction costs for buildings, homes, roads, etc. Since, limestone is an important ingredient in concrete and has few substitutes, substantial ripple effects could be felt throughout the Kaua'i economy.

Project Modifications: Moderate-Case Scenario

The Service indicates that an equally plausible scenario is that less extreme project modifications may enable quarrying to continue if the cave species are not found throughout the area. These include limiting access to caves (e.g., gating of occupied caves), rehabilitating caves, blocking airflow to caves, and potentially translocating cave animals to other caves. These project modifications would cost only a small fraction of the cost of a reduction in quarrying, and thus represent a significantly less extensive impact on the quarrying operations.

Potential Entities Impacted:

*Federal:* Service, EPA  
*Business:* Grove Farm

**3.d    Navigational Aids**

The proposed critical habitat contains one navigational aid maintained by the U.S. Coast Guard (USCG) on Makahuena Point in Unit 1b. This navigational aid is a small, unmanned structure that contains a navigational light and reflective panels.

Potential Project or Activity, Next 18 years: Operation and maintenance (O&M) of existing navigational aid

Federal Involvement: USCG ownership and operation.

Anticipated Costs of Consultations and Project Modifications: None

No consultation or project modifications involving the navigational aid are anticipated because O&M will not affect the *primary constituent elements* for the cave animals.

Potential Entities Impacted: None

**3.e. Places of Worship and Cemeteries**

**3.e.(1) Existing Places of Worship and Cemeteries**

Unit 1a of the proposed critical habitat contains four places of worship and one cemetery. Three of them are located on Waikomo Road just south of Koloa Town: Koloa Union Church, Southshore Baptist Mission, and Jehovah's Witnesses. St. Raphael's Church and rectory is just south of the three places of worship along Hapa Road. The historical remains of St. Raphael's Church and a cemetery near the rectory.

Potential Project or Activity, Next 18 years: Maintenance of existing church buildings and the cemetery

Federal Involvement: None

Anticipated Costs of Consultations and Project Modifications: None

No consultation or project modifications involving existing churches and cemeteries are anticipated because there is no *Federal involvement*.

Potential Entities Impacted: None

**3.e.(2) New Buildings for Places of Worship**

The Kaua'i Christian Fellowship is constructing a new building along the Koloa Bypass Road in proposed critical habitat Unit 1a. The foundation is already complete and future construction activities are not expected to affect the cave animals or their habitat.

Potential Project or Activity, Next 18 years: Construction of a building on an existing foundation

Federal Involvement: None

Anticipated Costs of Consultations and Project Modifications: None

No consultation or project modifications involving the construction of a new places of worship are anticipated because there is no *Federal involvement*.

Potential Entities Impacted: None

### **3.f. Power Lines**

A high-voltage power transmission line stretches across the northern portion of proposed critical habitat Unit 1a from the Waita Reservoir spillway to an electrical substation near the old Koloa Sugar Mill. Another high-voltage power transmission line enters the southwestern portion of Unit 1a from Port Allen and also connects to the Koloa Sugar Mill substation. The electrical substation is not within the critical habitat.

From the substation, four lower voltage distribution lines transmit electrical power to the developed areas in Koloa and Po'ipu. These distribution lines are above ground in undeveloped portions of the proposed critical habitat. Several lines go underground outside critical habitat in the developed areas of Po'ipu (Kaua'i Electric, 2002).

The primary O&M activities associated with the power lines involve treating wooden poles with pesticides to reduce termite damage and replacing poles that have rotted (Kaua'i Electric, 2002).

The *General Plan* indicates that there are no plans for new high-voltage power transmission lines in the Koloa District for the next 18 years. However, as the area develops, existing lines may need to be replaced or extended. New lines will be placed underground in development projects.

Potential Project or Activity, next 18 years: O&M, replacement, extension and undergrounding of existing and planned power lines.

Federal Involvement: None

Anticipated Costs of Consultations and Project Modifications: None

No consultations or project modifications involving electric power lines are anticipated because there is no *Federal involvement*.

Potential Entities Impacted: None

### **3.g. Water Systems**

#### **3.g.(1) Existing Irrigation Systems Within Proposed Critical Habitat**

As indicated in Table ES-1, several water-system components are located in Unit 1a. These include the Pu'uhi reservoir and two other unnamed reservoirs; portions of the ditch and tunnel near the Waita Reservoir, Wilcox Ditch, Mill Ditch, Short Siphon Ditch, and two unnamed ditches; one unnamed flume; four siphons; and one water tank. Most of these improvements are components of a major irrigation ditch system that was developed in the late 1800s and early 1900s to deliver large volumes of water to irrigate the Koloa Plantation sugarcane fields. Most of the ditches are still in

use for irrigating farmlands, although many of them have been converted to above-ground or underground pipe systems. The systems are currently operated and maintained by Grove Farm.

Potential Project or Activity, next 18 years: O&M of existing water systems

Water improvements require periodic maintenance to insure that pumps continue to run, leaks are detected and repaired, vegetation is cleared from ditch systems, etc.

Federal Involvement: None

Anticipated Costs of Consultations and Project Modifications: None

No consultations or project modifications involving existing irrigation systems are anticipated because they are considered unmapped holes in the critical habitat and there is no *Federal involvement*.

Potential Entities Impacted: None

### **3.g.(2) New Irrigation Improvements**

Little demand exists for new water systems to irrigate the farmlands in Koloa. The existing water systems were built to support sugarcane cultivation. Some former sugarcane fields have been replanted in diversified crops but most the land is fallow or used for grazing. Furthermore, most diversified crops require about half as much water per acre as sugarcane. Thus, the current irrigation systems should be more than adequate to meet future demand for irrigation water.

Potential Project or Activity, next 18 years: None anticipated

Federal Involvement: None

Anticipated Costs of Consultations and Project Modifications: None

No consultations or project modifications involving irrigating systems are anticipated because no plans exist for improvements and there is no *Federal involvement*.

Potential Entities Impacted: None

### **3.g.(3) Existing Potable Water Systems**

The Kaua'i County Department of Water (DOW) operates and maintains 48 underground wells and tunnels, 43 water tanks, and about 400 miles of pipeline throughout the island of Kaua'i.

Some of these existing improvements are in the proposed critical habitat. However, the DOW does not publicize the exact locations of its potable water improvements for security reasons.

As explained in Chapter I, existing potable water systems are “unmapped holes” within the boundaries of the critical habitat but are not considered by the Service to be part of the critical habitat.

Potential Project or Activity, next 18 years: O&M of existing potable water systems

Federal Involvement: None

Anticipated Costs of Consultations and Project Modifications: None

No consultations or project modifications involving existing potable water systems are anticipated: they are considered unmapped holes in the critical habitat, and there is no *Federal involvement*.

Potential Entities Impacted: None

### **3.g.(4) New Potable Water Improvements**

The DOW *Water Plan 2020* indicates that the Koloa-Po'ipu water system has sufficient supply to meet the projected 2020 demand for potable water. However, construction of a 0.5 million gallon (mg) water tank and a 1 mg water tank are required to meet projected storage needs in 2020. The locations for these tanks have not been determined, but since there are existing water tanks in the proposed critical habitat, it is conservatively assumed both tanks will be built there as well.

The DOW also plans to improve water distribution in the Koloa-Po'ipu area by 2020. Two distribution projects are planned for proposed critical habitat Unit 1a. The first is a 16-inch pipe to replace the existing transmission and distribution pipeline along the Po'ipu Road. The second is an 8-inch upgrade to the pipeline along Waikomo Road to support fire protection services in Koloa. Since these projects will be limited to existing rights-of-way where the underground lava structure has already been disturbed, the projects will not affect the *primary constituent elements* for the cave animals.

Development projects within the proposed critical habitat will require installing pipes to connect to the municipal water systems. Trenching for these and other utility systems will take place during the grading phases of the projects. Grading for planned development is addressed in the subsection below on Development, so it is not considered in this section.

Potential Project or Activity, next 18 years: Installation of DOW water tanks and pipelines

Federal Involvement: None

Anticipated Costs of Consultations and Project Modifications: None

No consultations or project modifications involving new potable water systems are anticipated because there is no *Federal involvement*.

Potential Entities Impacted: None

### **3.h. Roads**

#### **3.h.(1) Existing Roads**

Proposed critical habitat Unit 1a contains 14 paved roads and 26 unimproved private roads (most of which were originally used to haul sugarcane on the plantations—“cane-haul” roads). Unit 2 contains a small portion of an unimproved road, and Units 1b, 1c, and 3 do not contain any roads.

As mentioned in Chapter I, the O&M of existing paved roads is not subject to section 7 consultation because they are existing man-made features. However, the proposed rule states that unimproved roads are in critical habitat.

Potential Project or Activity, next 18 years: O&M of unimproved roads

Federal Involvement: None

The unimproved roads within the proposed critical habitat are privately owned so there is no *Federal involvement* for O&M activities.

Anticipated Costs of Consultations and Project Modifications: None

No consultations or project modifications involving O&M of unimproved roads are anticipated because there is no *Federal involvement*.

Potential Entities Impacted: None

#### **3.h.(2) New Roads**

The *Kaua'i Long Range Land Transportation Plan* and the *General Plan* identify several new roadway facilities needed by 2020. Four of these new facilities may affect proposed critical habitat Unit 1a. The Hawai'i DOT plans include a new two-lane road to connect Kipu and Po'ipu.

The plans for three Kaua'i County DPW facilities include (1) widening the Koloa Bypass Road to a four-lane divided highway, (2) widening Po'ipu Road to a four-lane divided highway between Koloa and the Lawa'i Road, and (3) building a new two-lane road to bypass Koloa to the west and service the Kukui'ula planned development (referred to as the West Koloa Bypass Road). The West Koloa Bypass Road may be financed privately by Alexander & Baldwin, Inc. (A&B) as part of the planned Kukui'ula development. After construction, A&B would probably cede the road to the county.

In addition to the projects mentioned in the *General Plan*, Grove Farm plans to widen and pave several existing cane-haul roads, and construct a number of smaller access roads to service its future resort/residential development (discussed below).

Potential Project or Activity, next 18 years: Planning and constructing the Po'ipu/Kipu Connector Road; widening Malhulia Road, Koloa Bypass Road and Po'ipu Road; constructing the West Koloa Bypass Road; and constructing several road projects on Grove Farm land.

Federal Involvement: U.S. Federal Highways Administration (FHWA) funding and/or U.S. Army Corps of Engineers (ACOE) section 404 permits

Major public road construction and improvement projects on Kaua'i are generally 80-percent funded by the FHWA.

Some of the road projects may be privately financed (such as the West Koloa Bypass Road and the road projects on Grove Farm land) since they will provide access to future development projects in the area. The West Koloa Bypass Road may require an ACOE section 404 permit because it may cross the Waikomo Stream. However, the Grove Farm road projects will only impact agricultural ditches and flumes that are not considered jurisdictional waters of the U.S., so they will not require a section 404 permit (ACOE, 2002). (One minor road in Grove Farm's planned resort/residential project may cross a natural drainage area. Potential impacts on this road project are discussed in the section below on resort/residential development.) Since Grove Farm road projects will not have *Federal involvement*, they will not require section 7 consultation.

#### Consultation and Costs:

- Total Section 7 Costs: \$79,400

Estimate based on the following: (1) four consultations on road projects; (2) Medium cost (from Table VI-1) of a consultation with a non-Federal Agency as the Applicant; and (3) two biological surveys of small-sized construction corridors, and two biological surveys of medium-sized construction corridors.



Anticipated Project Modification and Costs:

- Total Section 7 Costs: \$4 to \$6.4 million

If the cave animals had not been listed as endangered species, the construction of new roads in the Koloa/Po'ipu area would involve biological, archaeological, and geological surveys of the planned right-of-way; designing, grading and vibra-tamping the planned road site; and then paving with asphalt. If a large cave is found during surveys or grading, the road would be designed or re-designed to avoid the cave. If a large cave cannot be avoided, and there are no significant archaeological features in the cave, a portion of the cave would be collapsed and filled. Smaller caves could be crushed or filled in during the construction process.

Road construction will be handled differently due to the cave animals listing and critical habitat designation. Smaller caves and mesocaverns may be protected if it is determined that they could support the cave animals. Management may include landscaping with native vegetation or improving the quality of caves that are known to be *occupied* by the cave animals.

As discussed in Chapter I, the location of many caves and mesocaverns in the proposed critical habitat is not known, but there are many throughout the proposed critical habitat. Since geological studies for most road projects are designed to detect large caves, the Service may, as part of a section 7 consultation, require more detailed geological surveys to detect smaller caves and mesocaverns. This can be accomplished by drilling more test borings. A recent geological study in the proposed critical habitat area cost approximately \$3,000 per acre. Assuming the cost of a survey is twice as costly if its purpose is to detect smaller caves and mesocaverns, the increase in cost will be \$3,000 per acre.

The biological and geological surveys may identify certain areas that have many small caves and mesocaverns that could be *occupied* by the cave animals, particularly areas with little surface disturbance. However, many caves and mesocaverns under agricultural fields may be filled with silt from runoff and erosion associated with 150+ years of sugarcane cultivation.

Small cave and mesocaverns may also be found during the grading phase of road construction. If grading takes place mainly in deeper soils, then exposing a cave is unlikely. But if the grading takes place in areas having thin soils and rocky outcropping, there is a higher chance of uncovering or collapsing smaller caves and mesocaverns. The planned road projects in critical habitat mainly cover two USDA Soil Conservation Service soil types: Waikomo Stony Silty Clay (Ws) and Waikomo Very Rocky Silty Clay (Wt). Ws soils have an average depth of 20 inches, and rock outcrops cover less than 3 percent of the area. Wt soils are similar to Ws soils, except that rock outcrops cover 3 to 25 percent of the area (USGS, 1972). Based on this information, road projects on Wt soils are more likely to come across small caves near the surface during grading.

In order to minimize impacts on small caves and mesocaverns, road project representatives may pave certain portions of a road with PT-concrete instead of asphalt. PT-concrete is more likely to protect caves and mesocaverns because they can bridge underground spaces. This will reduce the need for vibra-tamping and other soil compaction methods. However, the cost of building roads with PT-concrete is higher than asphalt. The construction of primary asphalt roads in Hawai'i costs roughly \$825 per linear foot, while primary roads with PT-concrete construction costs \$1,425 per linear foot. The additional cost for PT-concrete is \$600 per linear foot (\$1,425 - \$825) (Wilson Okamoto & Associates, Inc., Hawai'i DOT, 2002).

Some of this cost will be offset over the life of the road, since concrete roads do not need to be resurfaced as often as do asphalt roads. The cost savings may be beyond the time frame of this analysis, so they are not considered further.

The percentage of each road project that may utilize concrete paving instead of asphalt is discussed below:

- **Po'ipu/Kipu Connector Road:** This 2-mile long, two-lane road project is planned for proposed critical habitat Unit 1a. Most of the road will cover areas in the Ws soil type, so it is not likely to hit rock outcroppings. Also, most of it will be sited on existing cane-haul roads, so the probability of crushing small surface caves and mesocaverns is small. Further, the surrounding area was cultivated in sugarcane, so many of the underground cave and mesocaverns may be filled with silt. There are no known populations of cave animals near the site. Thus, it is assumed that only 10 to 15 percent of the road site will have caves or mesocaverns significant enough to result in the use of PT-concrete rather than asphalt.
- **Widening the Koloa Bypass Road:** This 2.5-mile-long widening project will add two additional lanes to the existing Koloa Bypass Road in proposed critical habitat Unit 1a. Most of the road will cover areas in soil type Wt, so it is likely to come across rock outcroppings. However, the surrounding areas was cultivated in sugarcane, so many of the underground caves and mesocaverns may be filled with silt. One known population of cave animals is found near the northern portion of site, so it is assumed that approximately 15 to 25 percent of the site will have caves or mesocaverns significant enough to result in the use of PT-concrete rather than asphalt.
- **Widening Po'ipu Road:** This widening project will add two lanes to a half-mile of Po'ipu Road in proposed critical habitat Unit 1a. Most of the road will cover areas of soil type Wt, so it is likely to hit rock outcroppings. Only a small portion of the surrounding area was cultivated in sugarcane, so the underground caves and mesocaverns are less likely to be filled with silt.

There two known populations of the cave animals near the site, so it is assumed that 25 to 50 percent of the road site will have caves or mesocaverns significant enough to result in the use of PT-concrete rather than asphalt.

- **West Koloa Bypass Road:** This 0.8-mile, two-lane road project is planned for proposed critical habitat Unit 1a. Most of the road will cover areas of soil type Wt, so it is likely to come across rock outcroppings. Most of the area was not cultivated in sugarcane, so the underground caves and mesocaverns are less likely to be filled with silt. There are two known populations of the cave animals directly adjacent to the site, so it is assumed that 50 to 75 percent of the site will have caves or mesocaverns significant enough to result in the use of PT-concrete rather than asphalt.

Even with additional biological and geological studies and the use of PT-concrete in areas with biologically important caves, certain caves and mesocaverns will be destroyed during road construction. Also, road construction will involve the removal of existing vegetation in road rights-of-way. In order to concur with a not likely to adversely affect to the species and/or critical habitat, the Service may suggest landscaping and cave preservation project modifications described in Section 2. Road projects typically include landscaping along both shoulders of the road and in the median strip on four-lane highways. It is assumed that the road projects in critical habitat will have shoulders 30 feet wide, and 100-foot wide median strips. Project modification costs are estimated at \$3,200 to \$6,600 per acre landscaped, and \$570 to \$1,650 per acre surveyed and graded (Section 2).

Based on these cost estimates and assumptions, Table VI-2 summarizes the expected project modification costs attributable to the cave animals listing and critical habitat.

Potential Entities Impacted:

*Federal:* Service, FHWA, ACOE

*State:* Hawai'i DOT

*Business:* A&B

**3.i. Development**

A significant amount of development is planned for the proposed critical habitat by 2020. Some of it is “residential” development aimed at Hawai'i residents, but most of it is “resort/residential” development. Both terms are defined more fully below.

Commercial and industrial developments are also planned in critical habitat Unit 1a. Commercial development is planned adjacent to the existing Po'ipu Village Shopping Center in

Po'ipu, and in another site east of Koloa. Industrial development is planned near the existing Koloa Sugar Mill.

Including existing and planned golf courses and parks, nearly all of the proposed critical habitat in the Urban District, and almost one third of the land in the Agricultural District is already developed or is planned for development.

The planned development projects that are expected to be directly affected by section 7-related impacts are discussed below, while the projects that are expected to be indirectly affected by the listing and critical habitat designation are discussed in the next section, Indirect Costs.

### **3.i.(1) Resort/Residential Development**

Resort/residential units include single-family and multi-family units that are associated with a resort. Densities range from as high as 20 units or more per acre to less than one custom home per acre. Also, many resort-type amenities are offered, including golf, tennis, swimming, spa, etc. Some units are placed in rental pools and used by visitors; some are time-share units; some are second homes owned by non-Hawai'i residents; and some are homes of wealthy retirees from outside Hawai'i. Occupants of resort/residential units tend to spend more money than the average Hawai'i resident and have a lower demand on social services. Also, their income originates from outside Hawai'i. Thus, their economic impact is very similar to that of a tourist.

The majority of the resort/residential projects in the proposed critical habitat are planned for land in the Urban District, *mauka* (inland) of the existing oceanfront development in Po'ipu, and west of the Koloa Bypass Road. An oceanfront resort/residential project in the Urban District is also planned for critical habitat Unit 1b. In general, the highest density projects are planned closest to the ocean, and the lower density projects are closer to Koloa Town. High- and medium-density projects are also planned adjacent to the existing Kiahuna Golf Course and a planned 9-hole golf course expansion.

Additional resort/residential development is planned for the Agricultural District to the east of the Koloa Bypass Road. A low-density estate project and golf course are planned to take advantage of ocean views directly *mauka* of the existing Po'ipu Bay Resort Golf Course. Another resort/residential project is planned east of the existing quarry and set back from the Maha'ulepu shoreline.

Landowners and developers are planning to construct seven resort/residential projects in Unit 1a, one in Unit 1b, and one that may include portions of Units 1a, 2 and 3. Combined, these nine development projects are expected to provide *roughly* 2,500 resort/residential units at full development.

Potential Project or Activity, next 18 years: Resort/residential development projects

Federal Involvement: ACOE section 404 permit

Four of the development projects are not located on or adjacent to the coast or a stream or drainage, so the project representatives will not be required to get shoreline alteration or section 404 permits from the ACOE. Two projects are located on the coast, but the parcels are on top of low sea cliffs, so it is unlikely that future development will alter the shoreline in such a way as to require a shoreline alteration permit from the ACOE.

One of the projects in the western portion of the proposed critical habitat may impact agricultural ditches and flumes. However, these ditches are man-made and were never natural streams or drainages, so the project will not require a section 404 permit from the ACOE.

A project in the eastern portion of the proposed critical habitat is adjacent to the Waikomo Stream, and project representatives have already applied for an ACOE section 404 permit. A final permit was granted in 1997; and ACOE has no additional discretionary approvals over the project; it does not expect to enter into a consultation with the Service on this project (ACOE, 2002).

Finally, the high-density development near the Maha'ulepu coastline on Grove Farm land may impact the lower portion of the Mill Ditch. At one time, this ditch served as natural drainage for the area, but it was altered for agricultural purposes. Because the area was once a natural drainage area, ACOE will consider the ditch part of the jurisdictional waters of the U.S. and will require a section 404 permit (ACOE, 2002).

Consultation and Costs:

- Total Section 7 Costs: \$26,100 to \$39,300

Estimate is based on (1) one consultation for the Maha'ulepu development, (2) Medium to High cost (from Table VI-1) of a consultation with a non-Federal Agency as the Applicant, and (3) one biological survey of a large-sized construction site.

Anticipated Project Modification and Costs:

- Total Section 7 Costs: \$42.9 to \$43.2 million (worst-case)

The Maha'ulepu development is a planned medium-density resort/residential, hotel, and golf course project on approximately 400 acres. Portions of the development site are not in the proposed critical habitat but, based on preliminary plans, approximately 137 acres are in Unit 1a; 28 acres in Unit 2; and 20 acres in Unit 3. Approximately 105 acres in Unit 1a are planned for a golf course

(see “Golf Course and Community Park” section below), so the total area planned for hotel and resort/residential construction is 80 acres.

As a result of a section 7 consultation, the developer may attempt to minimize impacts on the cave animals *primary constituent elements* by using post-and-pier and/or PT-slab construction techniques for the multi-family and single-family homes. As mentioned in Section 2 of this chapter, these alternative construction techniques will not significantly increase the project costs.

However, as mentioned in the Roads subsection above, using PT-slabs to build the interior roads and driveways could be 73 percent more expensive than asphalt roads. Since infrastructure costs are a large portion of a developer’s costs, this increase could make the project economically infeasible. If the modification makes the project unprofitable, the developer will not agree to the modification in order to avoid a finding of jeopardy or adverse modification of critical habitat. Additionally, the Service is unlikely to suggest it as a reasonable and prudent alternative, because Service guidelines indicate that project modifications should be economically and technically feasible (Service, 1998). As such, the use of PT-slab roads are not anticipated for this development.

Instead, the Service would recommend that all landscaping be done with native vegetation, and that any large caves found in the project site be preserved (Service, 2002). Approximately 50 to 60 percent of the land area of a medium-density resort/residential development landscaped (No Ka Oi, 2002). Based on the project modification costs listed in Section 2, and the fact that 80 acres of the development are in critical habitat, the additional landscaping cost will range from \$128,000 to \$316,800, and the additional cave preservation cost will range from \$45,600 to \$132,000.

Based on its proximity to the ocean, a 31-acre strip of land within this development area will be used for the construction of the hotel. Approximately 24 acres (77 percent) of this strip are in the westernmost corner of Unit 1a, so it is assumed that 77 percent of the planned hotel building will be in critical habitat.

#### Worst-Case Scenario: Additional Loss of Basement Space

The portion of the planned hotel that will be in critical habitat can be constructed on a large PT-slab (Construction Consultants Pacific, Inc., 2002). However, this type of construction will eliminate a portion of the underground basement that is typically used in hotels on Kaua’i for machinery, laundry rooms, storage, etc. The hotel cannot be built higher because a Kaua’i County height restriction limits total building heights to the approximate height of a coconut tree (40 feet, or about four stories above ground). While the plans for the hotel are still in the conceptual stages, the location of the final hotel footprint will be highly restricted due to archeological resources in the area and the potential for large limestone caves that could make the foundation structurally unsound. In addition, the area falls within the Special Management Area (SMA), a county regulation that restricts developments near the shoreline (see Chapter IV). As such, as a worst case scenario, it is assumed that the hotel will not be able to increase its footprint or relocate completely outside of

critical habitat. If this is the case, and a portion of the underground story cannot be built, the hotel could lose 77 percent of the visitor rooms on the first floor. The hotel is planned to contain 250 rooms, or roughly 63 rooms per floor, so the project modification could result in a loss of 50 rooms (63 rooms x 77 percent)

Table VI-4 in the Indirect Costs section below provides a detailed methodology for assessing the economic impacts associated with losses of various types of development. The multipliers and assumptions in Table VI-4 are used below to estimate the economic impact of the loss of 50 hotel rooms. The primary economic impact is a loss in hotel room revenues on the order of \$2.9 million per year. Assuming 5 percent profit remaining on Kaua'i, this would be an annual loss of \$145,000 in profit. Kaua'i County planners and other landowners familiar with the permitting process on Kaua'i indicate that 2015 is the earliest the hotel will begin operation. The total loss in profits for the time period of this analysis would be \$725,000 (\$145,000 x 5 years). This loss will be shared by the operator of the hotel and by Grove Farm through a reduction in property values.

The loss of 50 rooms will also affect the number of visitors who come to Kaua'i. As discussed in Chapter II, tourism is the largest component of Kaua'i's economy, so this could have significant indirect or "ripple" effects. Based on the multipliers and assumptions in Table VI-4, the loss will result in an average reduction of 105 visitors per day, \$4.3 million in annual non-hotel room visitor expenditures, \$3.3 million in indirect sales from total visitor expenditures, and a loss in \$380,000 in annual profits on Kaua'i related to visitor expenditures. Over 5 years, this will result in a loss of \$1.9 million in profits related to visitor expenditures, and \$14.4 million in after-tax payroll.

The loss in hotel and the other visitor-industry revenues will result in the loss of 121 jobs. This will cause a reduction in the number of residents, which will reduce the demand for residential, commercial, and industrial development and other goods and services on Kaua'i. Also, construction activity will be reduced since fewer units will be built in the hotel at Maha'ulepu. Over 5 years, this will result in the loss of \$36.9 million in construction revenue, \$3.2 million in direct and indirect construction profits, \$16.3 million in after-tax construction payroll, \$1.9 million in after-tax profits and commissions from property sales. The change in economic activity will also result in a loss of \$4.3 million in county tax revenue.

The total loss in income benefits (profits, commissions, after-tax payroll, and tax revenue) to Kaua'i will be \$42.7 million from 2015 to 2020, or about \$9 million per year.

#### Moderate-Case Scenario: Loss of Some but not All Basement Space

The Service indicates that, in all likelihood, the result of the consultation would be that a smaller basement could be built rather than the prohibition of any basement whatsoever. As such, some fraction of first-floor units, but not all, may be compromised. Therefore, the loss of all units

and associated direct and “ripple” effects likely overestimates the true impact associated with implementation of section 7 for the cave species.

Potential Entities Impacted:

*Federal:* Service, ACOE

*State:* State of Hawai'i

*County:* County of Kaua'i

*Private:* Grove Farm, the future hotel operator, and businesses in the tourism, construction, real estate, and other industries on Kaua'i.

**3.i.(2) Existing Golf Courses and Parks**

Proposed critical habitat Unit 1a contains two existing 18-hole golf courses, covering a total of approximately 310 acres. The Kiahuna Golf Course is located in the western portion of Unit 1a, while the Po'ipu Bay Resort Golf Course is located along the coast just east of Po'ipu also in Unit 1a. There is also a small county park in the northern portion of Unit 1a adjacent to the Koloa Bypass Road.

Typical O&M activities for existing golf courses include chemical applications, fertilizer applications, irrigation repairs including some electrical work, mechanical maintenance (e.g., aerating the ground surface, building some masonry, etc.), and mowing, trimming, and edging (Kiahuna Golf Course, 2002). O&M activities for the county park may include similar but less frequent and less intensive activities.

Potential Project or Activity, next 18 years: O&M of existing golf courses and parks

Federal Involvement: None

Anticipated Costs of Consultations and Project Modifications: None

No consultations or project modifications involving the O&M of existing golf courses and parks are anticipated because there is no *Federal involvement*.

Potential Entities Impacted: None

**3.i.(3) Planned Golf Courses and Parks**

Three of the planned resort/residential projects mentioned above may include golf courses, and one planned development may include a community park within proposed critical habitat Unit 1a.



One planned golf course site is near the intersection of Po'ipu Road and Lawa'i Road. This site is approximately 75 acres and is large enough for a 9-hole golf course. The new golf course would be adjacent to the existing Kiahuna Golf Course. All of the site is within proposed critical habitat Unit 1a.

Another planned golf course site would be part of the a planned low-density 50-home resort/residential development on Grove Farm land. The site is approximately 150 acres and is large enough for an 18-hole golf course. All of the site is in Unit 1a.

The final planned golf course site would be part of the Maha'ulepu development on Grove Farm land mentioned above. The site is also approximately 150 acres and is large enough for an 18-hole golf course. Approximately 105 acres of this site is in Unit 1a.

The Kukui'ula development includes a 25-acre community park site. The entire park site is in Unit 1a.

Potential Project or Activity, next 18 years: Construction of golf courses and a community park

Federal Involvement: Section 404 ACOE permit

The golf course adjacent to the existing Kiahuna Golf Course may impact the Waikomo Stream, in which case the project would require a section 404 permit from the ACOE. As planned, the Maha'ulepu development golf course will impact the Mill Ditch, which at one time was a natural drainage, so it would also require a section 404 permit from the ACOE. The construction of the other golf course will not affect any natural drainages so it will not have *Federal involvement*.

The community park is part of the Kukui'ula development. As discussed above, this development adjacent to the Waikomo Stream is not likely to need a consultation with the Service (ACOE, 2002).

Consultation and Costs:

- Total Section 7 Costs: \$22,000

Estimate is based on (1) one consultation for the golf course site adjacent to the existing Kiahuna Golf Course, (2) Medium cost (from Table VI-1) of a consultation with a non-Federal Agency as the Applicant, and (3) one biological survey of a medium-sized site. The cost of a consultation for the Maha'ulepu golf course is not included here because the golf course construction will be considered during the section 7 consultation on the entire Maha'ulepu development project listed above.

Anticipated Project Modification and Costs:

- Total Section 7 Costs: \$217,800 to \$594,000

Two of the caves that are known to be *occupied* by the cave animals are located under or adjacent to an existing golf course. Thus, the operation of a golf course does not appear to harm the cave animals. The construction of a golf course will involve grading and landscaping. In order to minimize the impacts of these activities, the golf course developers may preserve any large caves found on the site and use native vegetation for the areas around the greens and fairways.

The construction of the golf course adjacent to the Kiahuna Golf Course may involve grading of the entire 75-acre site. Similarly, the construction of the Maha'ulepu golf course may involve grading of the 105 acres in critical habitat. Based on the cost for cave preservation project modifications presented in Section 2, the cave preservation project modification cost will be \$42,750 to \$123,750 for the Kiahuna Golf Course and \$59,850 to \$173,250 for the Maha'ulepu Golf Course.

After the sites are graded, portions of the golf courses will be landscaped with shrubs, trees, and other plants in the areas around the greens and fairways. A local landscaping firm indicates that approximately 20 to 25 percent of golf course projects are landscaped with plants other than grass (No Ka Oi, 2002). Based on the cost for landscaping project modifications presented in Section 2, the landscaping project modification cost will be \$48,000 to \$123,750 for the Kiahuna Golf Course and \$67,200 to \$173,250 for the Maha'ulepu Golf Course.

Potential Entities Impacted:

*Federal:* Service, ACOE

*Private:* Grove Farm, Kobayashi Group, LLC

**3.i.(4) Existing Residential Units**

Residential units are single-family homes or multi-family homes (apartments or condominiums) that are typically owned by full-time Hawai'i residents who live and work on the island and live in the unit as their a primary residence.

There are approximately 62 residential units in proposed critical habitat Unit 1a. Most of them are single-family units located south of Koloa. As stated in Chapter 1, existing homes and buildings for which the underlying bedrock has been altered are unmapped holes and are not considered by the Service to be part of the critical habitat.

It is expected that over the next 18 years, additions and improvements to the existing homes will be made. Additions that cover areas beyond the footprints or underground utility corridors of existing homes may adversely affect the cave animals and/or their habitat. For example, building

an addition to an existing home, building a larger home, or building an *ohana* unit (a home for a family member) could remove deep-rooted vegetation and destroy caves and mesocaverns.

Potential Project or Activity, next 18 years: Additions or improvements to existing homes and existing home lots

Federal Involvement: U.S. Department of Housing and Urban Development (HUD) Section 203(k) Rehabilitation Mortgage Insurance and funding

Most of the Federal housing loan and loan-guarantee programs are designed to aid in the purchase of an existing home. As mentioned above, existing homes do not contain the *primary constituent elements* for the cave animals, and are excluded from critical habitat, so these programs would not require a section 7 consultation.

However, HUD does have a mortgage-insurance program for homebuyers and homeowners to finance home purchases and rehabilitate homes (section 203(k), Rehabilitation Mortgage Insurance). “Rehabilitation” includes improving the existing structure, but it can also include building additions, treating the home for pests, connecting to public water and sewer systems, installing septic systems, etc. These projects could adversely affect the cave animals and require a section 7 consultation.

The Section 203(k) program is not widely used on Kaua'i. Since the start of the program about 5 years ago, only two people on Kaua'i have applied for the insurance, and neither one of them was in Koloa or Po'ipu (HUD, 2002). If this trend continues, seven additional homeowners will apply for Section 203(k) insurance over the next 18 years on Kaua'i ( $2 \div 5 \times 18$ ). Assuming that rate doubles, 14 people will apply over the next 18 years ( $7 \times 2$ ).

The Kaua'i County Office of Community Assistance (OCA) administers a direct rehabilitation loan program. Projects that qualify for it are similar to the Federal rehabilitation projects above, and the program has *Federal involvement* because the OCA uses HUD Community Development Block Grants to fund the loans.

About ten households per year participated in the OCA loan program on Kaua'i (OCA, 2002). If this trend continues, 180 households will receive county loans with *Federal involvement* over the next 18 years ( $10 \times 18$ ).

Counting both the HUD and OCA programs, approximately 194 households will participate in a loan program with *Federal involvement* over the next 18 years ( $180 + 14$ ).

In 2000, there were 25,331 housing units on Kaua'i. Approximately 70 percent of them (17,732 units) are assumed to be residential units (resort/residential units are not included in this total because they are not likely to meet the household income requirements for the county

rehabilitation program). As indicated in Chapter II, 2,500 to 6,700 new residential units will be built island-wide by 2020, making the total 20,232 to 24,432 ( $17,732 + 2,500$  and  $17,732 + 6,700$ ). About 194 of these units (between 0.79 and 0.96 percent) are expected to participate in rehabilitation loan programs with *Federal involvement* by 2020.

There are 62 existing homes in the proposed critical habitat, and 642 additional residential units are planned for critical habitat by 2020 (Table VI-4 below). If all these units are built, the total number of residential units in critical habitat will be 704 ( $642 + 62$ ). Assuming the percentage calculated above applies to the units in critical habitat, then six or seven units in critical habitat will participate in rehabilitation loan programs with *Federal involvement* by 2020 ( $704 \times 0.79$  percent and  $704 \times 0.96$  percent).

#### Consultation and Costs:

- Total Section 7 Costs: \$43,200 to \$50,400

Estimate is based on (1) six to seven consultations for rehabilitation loan projects with *Federal involvement* (2) Low cost (from Table VI-1) of a consultation with a non-Federal Agency as the Applicant, and (3) six to seven biological surveys of small-sized construction sites.

#### Anticipated Project Modification and Costs:

- Total Section 7 Costs: \$4,900 to \$11,900

The average lot size of the existing and planned residential units in critical habitat is approximately 1 acre. It is assumed that the average future rehabilitation projects will include landscaping one fourth of the existing lot (0.25 acre), and constructing a new structure covering approximately 1,500 square feet (0.034 acre). Based on these assumptions, between 1.5 and 1.75 acres may be landscaped, and between 0.20 and 0.24 acre may be excavated or graded as part of the six to seven projects mentioned above. Based on the cost per acre of landscaping and cave preservation project modifications mentioned in Section 2, the total expected cost will range from \$4,900 to \$11,900.

The rehabilitation projects could also include termite control of two types, tent fumigation and a baiting program, neither of which will adversely affect the cave animals (Service, 2002). Accordingly, no project modification costs are associated with termite control.

#### Potential Entities Impacted:

*Federal:* Service, HUD  
*County:* OCA

### 3.i.(5) Planned Residential Development

Current plans call for one large residential development project and several smaller ones in proposed critical habitat Unit 1a. The Weliweli expansion, a large development, is entirely within proposed critical habitat Unit 1a. This project will likely be a State Housing and Community Development Corporation (HCDC) project to provide affordable housing as the area develops. There are currently no detailed plans for the development, but the *General Plan* indicates the it could contain up to 400 housing units.

Additional residential development may be constructed on various parcels in Unit 1a just south of Koloa. This area contains 30 to 35 acres of vacant land in the Urban District, and 50 to 60 acres of vacant land in the Agricultural District. Development in this area will include single-family and a few multi-family units. Some of the large parcels may be subdivided.

Potential Project or Activity, next 18 years: Planned residential development

Federal Involvement: Possible Federal funding from HUD or other sources for the Weliweli project

The State Weliweli expansion project may use some Federal funding from HUD or other sources. Past State housing projects have used Federal funding.

Some remaining smaller development projects may be located near Waikomo Stream. However, none of the existing small developments near Waikomo Stream have received a section 404 permit (ACOE, 2002). Thus, it is assumed that future small residential developments not will have *Federal involvement*.

#### Consultation and Costs:

- Total Section 7 Costs: \$22,000

Estimate is based on (1) one consultation for the HCDC Weliweli expansion project (2) Medium cost (from Table VI-1) of a consultation with a non-Federal Agency as the Applicant, and (3) one biological survey of a medium-sized construction site.

#### Anticipated Project Modification and Costs:

- Total Section 7 Costs: \$143,200 to \$326,700

As a result of a section 7 consultation, the State may attempt to minimize impacts on the *primary constituent elements* for the cave animals by using post-and-pier and/or PT-slab construction techniques for the multifamily and single-family units. As mentioned in Section 2 of this chapter, these alternate construction techniques will not significantly increase project costs.

However, as mentioned in the road section above, using PT-slabs to build the interior roads and driveways could be significantly more expensive than asphalt roads. Since infrastructure costs are a large portion of a developers' costs, this increase could make the project economically unfeasible. Since Service guidelines indicate that project modifications should be economically and technically feasible (Service, 1998), the use of PT-slab roads are not anticipated for this development.

The Service would recommend that all landscaping be done with native vegetation, and that any large caves found at the project site be preserved. An estimated 50 percent of the land on residential housing projects is landscaped (No Ka Oi, 2002). Based on project modification costs listed in Section 2 and the fact that 66 acres of the development are in critical habitat, the additional landscaping cost will range from \$105,600 to \$217,800, and the additional cave preservation cost will range from \$37,600 to \$108,900.

Potential Entities Impacted:

*Federal:* Service, HUD

*State:* HCDC

**3.j. Commercial Development**

The northern portion of proposed critical habitat Unit 1a contains 2.6 acres that are zoned by the county as general commercial. The site is located to the north of Weliweli Road where it intersects with Waikomo Road. The existing buildings on this site, are mostly residential buildings, but future commercial development is possible on the site.

Unit 1a also includes 2.1 acres of a 3.8-acre lot that is zoned by the county for neighborhood commercial use. Village Properties, Inc. is in the process of purchasing this vacant lot and plans to construct a shopping center there within a year that will be similar to the existing adjacent Po'ipu Village Shopping Center (Village Properties, Inc., 2002).

Potential Project or Activity, next 18 years: Commercial development

Federal Involvement: None

Anticipated Costs of Consultations and Project Modifications: None

No consultations or project modifications involving the commercial development are anticipated because there is no *Federal involvement*.

Potential Entities Impacted: None

### **3.k. Industrial Development**

There is no existing industrial land in the proposed critical habitat. The old Koloa Sugar Mill is surrounded by Unit 1a, but the mill and the disturbed areas around it are not in this unit. The mill is not operational, but the site is being used for light-industry (e.g., a baseyard for a seed corn operation, agriculture contractors, tour operators, etc.).

Grove Farm, who owns the mill and the land, intends to expand the site and apply to the county to rezone it to the general zone, which allows industrial use (Grove Farm, 2002). Approximately 24 acres of Unit 1a directly east of the Koloa Sugar Mill is intended for industrial expansion in the short-term, and an additional 40 acres farther east are suited for industrial expansion in the long term. Currently, all of this area is in the Agricultural District

It is assumed that Grove Farm will receive approvals and permits for industrial use on the 24-acre site. Additional industrial development beyond that is not expected to occur within the time frame of this analysis.

Potential Project or Activity, next 18 years: Industrial development

Federal Involvement: EPA permits

Some industrial activities may require emissions permits from the EPA, which has given the Hawai'i State Department of Health the authority to issue the permits. The EPA only becomes involved in particularly complex or controversial permits. Since the planned industrial expansion will be in critical habitat, and the permit might become controversial, it is conservatively assumed that the EPA will be involved.

Consultation and Costs:

- Total Section 7 Costs: \$22,000

Estimate is based on (1) one consultation for industrial development (2) Medium cost (from Table VI-1) of a consultation with a non-Federal Agency as the Applicant, and (3) one biological survey of a medium-sized construction site.

Anticipated Project Modification and Costs:

- Total Section 7 Costs: \$21,400 to \$55,400

As a result of a section 7 consultation, the developer may attempt to minimize impacts on the *primary constituent elements* for the cave animals by using the PT-slab construction technique for the industrial buildings, which will not significantly increase project costs (Section 2).

However, as mentioned in the road section above, using PT-slabs to build the interior roads and parking lots could be significantly more expensive than asphalt roads and parking lots. Since infrastructure costs comprise a large portion of a construction costs, this increase could make the project economically infeasible. Service guidelines indicate that project modifications should be economically and technically feasible (Service, 1998), so the use of PT-slab roads is not anticipated for this development.

Instead, the Service would recommend that all landscaping be done with native vegetation, and that any large caves found at the project site be preserved. Approximately 10 percent of industrial projects are landscaped (No Ka Oi, 2002). Based on the project modification costs given in Section 2, and the fact that 24 acres of the development are in critical habitat, the additional landscaping is estimated at \$7,700 to \$15,800 and the additional cave preservation cost at \$13,700 to \$39,600.

Potential Entities Impacted:

*Federal:* Service, EPA

*Private:* Grove Farm

**3.1. Wastewater Treatment**

The Koloa and Po'ipu urban areas are currently serviced by private wastewater treatment plants (WWTPs), individual wastewater systems (e.g., septic tanks), and injection wells (discussed in the following section). Most of these facilities are outside the proposed critical habitat. However, a portion of the WWTP built to service A&B's planned Kukui'ula development is in proposed critical habitat Unit 1a. In addition, the single-family units in the critical habitat designation near Koloa in Unit 1a may have existing individual wastewater systems. As mentioned in Chapter I, these existing facilities are not considered critical habitat.

Future residential development (discussed above) may involve individual wastewater systems. Developers of larger resort/residential developments will either connect their buildings to existing WWTPs or build injection wells (discussed below). However, as the area develops over the next 18 years, additional regional wastewater treatment capacity will be needed.

The *General Plan* indicates that the county does not currently have a plan to provide wastewater treatment service to Koloa and Po'ipu. The county is considering expanding the Kukui'ula WWTP and assuming responsibility for its operation. A&B has already excavated two pits for future use as wastewater treatment ponds in Unit 1a to the east of the existing treatment plants. These pits will be converted into treatment ponds when it becomes necessary to expand the plant. However, since the pits have already been blasted and excavated, the area is not likely to contain the *primary constituent elements* for the cave animals and so the expansion will not require consultation with the Service.



The Kaua'i County DPW is also considering constructing two smaller wastewater plants to serve Koloa and Po'ipu. The county may favor this plan because it would place the treatment plants closer to the source, rather than the Kukui'ula plant which is relatively far from Po'ipu (County of Kaua'i, 2000). The sites for these plants have not been determined, but it is possible that one or both of them will be located within the vacant lands in Unit 1a.

Potential Project or Activity, next 18 years: Construction of IWSs and regional WWTPs

Federal Involvement: U.S. Environmental Protection Agency (EPA) funding, permitting

IWSs are permitted by the Hawai'i Department of Health Wastewater Branch and do not have any *Federal involvement*.

Large regional WWTPs typically are partially funded by EPA grants, required to obtain a NPDES permit, required to meet EPA standards, etc., so it is assumed the planned regional WWTPs will have *Federal involvement*.

Consultations and Costs:

- Total Section 7 Costs: \$22,000 to \$44,000

Estimate is based on (1) one to two consultations on the construction of regional WWTPs in the next 18 years, (2) Medium cost (from Table VI-1) of a consultation with a non-Federal agency as the Applicant, and (3) one to two biological surveys of medium-sized construction sites.

Anticipated Project Modifications and Costs:

- Total Section 7 Costs: \$27,400 to \$99,000

Plans for future county WWTPs are not complete, so their exact sizes are not known. Based on existing WWTPs in the area, each plant could require 10 to 15 acres. As a result of a section 7 consultation, the developer may use a PT-slab foundation to minimize disturbance to the ground surface and underlying rock. As discussed in Section 2 of this chapter, this would not significantly increase the project costs.

The Service may also recommend that all landscaping be done with native vegetation, and that any large caves that are found in the project site be preserved. Approximately 25 percent of the ground surface at WWTPs is landscaped (No Ka Oi, 2002). Based on the project modification costs in Section 2, and the fact that 20 to 30 acres for the WWTPs may be in critical habitat, additional landscaping could cost \$16,000 to \$49,500. Cave preservation costs could range from \$11,400 to \$49,500.

Potential Entities Impacted:

*Federal:* Service, EPA  
*County:* DPW

**3.m. Injection Wells**

Two 175-foot deep injection wells encased in 4-inch piping are located just south of the Kukui'ula WWTP in the proposed critical habitat (A&B, 2002). They are not operating, but may be put in use as the area develops. Any wastewater injected into these wells will go too far underground to adversely affect caves or mesocaverns that might be *occupied* by the cave animals.

As urban development continues in Koloa and Po'ipu, additional injection wells may be required. Current large residential and resort/residential projects in the area use injection wells, so it is likely that future development projects will as well. As mentioned above, one large residential project and nine resort/residential projects are planned in the proposed critical habitat. Thus, there may be ten additional wells drilled within the proposed critical habitat by 2020.

Potential Project or Activity, next 18 years: Drilling and use of injections wells

Federal Involvement: U.S. Environmental Protection Agency (EPA) involvement.

Currently, injection wells are permitted by the Hawai'i Department of Health Safe Drinking Water Branch. However, primary enforcement authority lies with the EPA. The EPA may become involved if a permit application is controversial. Since the area supports the cave animals, and since injection wells in this region may eventually pollute the ocean, certain permit applications may require EPA involvement.

It is not known how many future permit applications may require EPA involvement because the cave animals were listed in 2000, and there have been no major developments since the listing. It is assumed that 25 to 50 percent of the permit applications will require EPA involvement.

Consultations and Costs:

- Total Section 7 Costs: \$21,600 to \$36,000

The estimate is based on (1) three to five consultations on controversial injection well permits in the next 18 years, (2) Low cost (from Table VI-1) of a consultation with a non-Federal agency as the Applicant, and (3) three to five biological surveys of small-sized construction sites.

Anticipated Project Modifications and Costs:

- Total Section 7 Costs: \$60,000 to \$125,000

The drilling of injection wells may modify the caves and mesocaverns by exposing them to open air or by filling them with wastewater. In order to avoid these impacts, project representatives will have to install a non-perforated pipe or casing around the first 50 feet of the well. This will prevent any wastewater from entering caves and mesocaverns, and reduce the exposure of the underground spaces to open air. In addition, the open space around the bottom and top of the casing will have to be sealed with concrete to prevent wastewater from seeping up into the cave areas and surface water from flowing down into the caves and mesocaverns. A company that drills injection wells on Kaua'i indicates that this type of project modification will cost between \$20,000 to \$25,000 per well (Beylik Drilling, 2002).

Many injection wells in this area are encased for reasons unrelated to the cave animals. However, non-perforated casing is not required by State law unless a large cave (i.e., greater than 3 feet in diameter) is found during drilling (HAR, 11-23). Since the cave animals *occupy* caves and mesocaverns smaller than this, it is conservatively assumed that the project representatives will have to make the modifications mentioned above.

Potential Entities Impacted:

*Federal:* Service, EPA

*Private:* Grove Farm, CIRI Land Development, Knudsen Trust, Kobayashi Group LLC

**3.n. Underground Storage Tanks**

Underground storage tanks are commonly used to store diesel fuel, gasoline, used oil, and other fuels. Gas stations store gasoline, while hotels and utilities store diesel fuel for back-up electrical generators. In Koloa and Po'ipu, the underground storage tanks are being used by three hotels (3 tanks); a golf course (2 tanks), the telephone utility (1 tank), and a gas station (4 tanks). None of these tanks is in the proposed critical habitat (Hawai'i DOH, 2002).

Potential Project or Activity, next 18 years: Construction of underground storage tanks for five planned projects.

As mentioned above, three golf courses and a hotel are planned for critical habitat Unit 1a. These projects may involve installing underground storage tanks. Furthermore, it is possible that another gas station will be built in the Koloa district if new residential and resort/residential development occurs. In this case, the gas station may be located near the new development, so there is a high probability that it will be located in critical habitat. A total of five projects over the next 18 years could require new underground storage tanks.

Federal Involvement: None

Currently, underground storage tanks are permitted by the Hawai'i Department of Health Solid and Hazardous Waste Branch (HAR, 11-281). The EPA does require that it be notified, but it does not issue permits (40 CFR 280). Thus, there is no *Federal involvement*.

Anticipated Costs of Consultations and Project Modifications: None

No consultations or project modifications are anticipated because there is no *Federal involvement*.

Potential Entities Impacted: None

### **3.o. Ecotourism**

Commercial hiking tours, led by professional naturalist guides and featuring Hawai'i's unique ecosystems and endemic plants, are offered along the Maha'ulepu coast and in other natural areas of Kaua'i. Units 1a and 2 contain portions of the Maha'ulepu coast.

Potential Project or Activity, next 18 years: Commercial hiking tours

Federal Involvement: None

Anticipated Costs of Consultations and Project Modifications: None

No consultations or project modifications are anticipated because the activity does not have *Federal involvement*.

Potential Entities Impacted: None

### **3.p. Natural Disasters**

The most likely natural disasters to affect proposed critical habitat—and the ones that would cause the most damage—are a major hurricane or a *tsunami* hitting Kauai. In the past 50 years, Kaua'i has been hit or nearly hit by three hurricanes and three *tsunami*. In the coastal regions proposed for critical habitat, damage caused by a major hurricane or *tsunami* would include damaged homes and hotels, downed power lines, coastal flooding, surf damage, downed trees and branches, and washed out roads. Recovering from a natural disaster would involve rebuilding damaged structures, repairing phone lines, and clearing away downed trees, branches, and other debris.

### **3.p.(1) Federal Emergency Management Agency (FEMA)**

In the event of a natural disaster, FEMA may provide individual assistance in the form of low-interest loans, cash grants, housing assistance, etc. FEMA also has a Public Assistance Grant Program that provides disaster aid to State and local governments to repair, replace, or supplement parts of a community's infrastructure damaged in a natural disaster.

Potential Project or Activity, next 18 years: Recovery efforts

Federal Involvement: Financial assistance from the FEMA

Consultation and Costs:

In the event of a natural disaster, a consultation with the Service would be required if financial assistance is sought from FEMA to help residents, businesses or government recover from the occasional natural disaster in areas where there are listed species and/or critical habitat. In such emergencies, the Service expedites consultations.

- Total Section 7 Costs: \$7,500 to \$15,000

Estimate is based on 10 to 20 days of effort by Service biologists to review the proposed projects at approximately \$750 per day.

Anticipated Project Modifications and Costs:

- Total Section 7 Costs: Minor

As long as natural disaster recovery projects are planned so that they avoid further damage to the undisturbed areas of critical habitat—which is likely to be the case—the proposed cave animals critical habitat designation would have little or no economic impact on FEMA projects following a natural disaster.

Potential Entities Impacted:

*Federal:* Service, FEMA

### **3.p.(2) USDA Farm Service Agency Disaster Assistance**

A natural disaster in the proposed critical habitat could affect agricultural land and infrastructure. The FSA has several programs designed to aid farmers and ranchers affected by natural disasters. These programs are summarized below:

- **Emergency Conservation Program (ECP):** ECP provides emergency funding for farmers and ranchers to rehabilitate farmland damaged by wind erosion, floods, hurricanes, or other natural disasters, and for carrying out emergency water conservation measures during periods of severe drought.
- **Non-insured Crop Disaster Assistance Program (NAP):** NAP provides financial assistance to eligible producers affected by natural disasters. This federally funded program covers non-insurable crop losses and planting prevented by disasters.
- **Emergency Loan Assistance (EM):** EM provides emergency loans to help producers recover from production and physical losses due to drought, flooding, other natural disasters, or quarantine.
- **Emergency Haying and Grazing Assistance:** This program allows haying and grazing of certain Conservation Reserve program acreage in areas suffering from weather-related natural disasters.

If the proposed critical habitat is affected by a natural disaster, some of the farmers and ranchers may elect to participate in one or more of these FSA programs.

Potential Project or Activity, next 18 years: Agricultural disaster recovery projects

Federal Involvement: Financial assistance from the FSA

Consultation and Costs:

In the event of a natural disaster, a consultation with the Service would be required if financial assistance is sought from FSA by farmers and ranchers in critical habitat. In such emergencies, the Service expedites consultations.

- Total Section 7 Costs: \$7,500 to \$15,000

Estimate is based on 10 to 20 days of effort by Service biologists to review the proposed projects at approximately \$750 per day.

Anticipated Project Modifications and Costs:

- Total Section 7 Costs: Minor

As long as natural disaster recovery projects are planned so that they avoid further damage to the undisturbed areas of critical habitat—which is likely to be the case—the proposed cave

animals critical habitat designation would have little or no economic impact on FSA projects following a natural disaster.

Potential Entities Impacted:

*Federal:* Service, FSA

**3.q. Service Incidental Take Permits**

As discussed in Chapter III, the Act allows the Service to permit *take* by private applicants that would otherwise be prohibited, provided such *taking* is "incidental to, and not [for] the purpose of, the carrying out of an otherwise lawful activity." Section 10(a)(1)(B) of the Act allows non-Federal parties planning activities that have no *Federal involvement*, but which could result in the incidental *taking* of listed animals, to apply for an incidental *take* permit. The application must include an HCP that specifies: (1) the impact which will likely result from the taking; (2) what steps the applicant will take to minimize and mitigate such impacts and the funding that will be available; (3) what alternatives were considered; and (4) such other measures that the Secretary may require as necessary or appropriate for purposes of the plan. After opportunity for public comment, the Secretary must issue the permit if she finds that : (1) the taking will be incidental; (2) the application will, to the extent practicable, minimize and mitigate the impacts of such taking; (3) the applicant will ensure that adequate funding for the plan will be provided; (4) the taking will not appreciably reduce the likelihood of survival and recovery of the species in the wild; (5) the necessary or appropriate measures will be met; and (6) the plan will be implemented.

Certain projects that have *Federal involvement* can obtain incidental *take* authority as part of a section 7 consultation if the Service determines that the action will not jeopardize the species. This authority is included in an incidental *take* statement. It may include reasonable and prudent measures necessary to minimize the impacts of the *taking* of the species.

Preparing an HCP and obtaining an incidental *take* permit are not considered a direct section 7-related impact, so the costs associated with these activities are not addressed in this section. Since critical habitat may indirectly affect the number of HCPs prepared, HCP costs are addressed in the section on Indirect Costs below.

Because issuing incidental *take* permits is a Federal action, the Service must conduct an internal section 7 consultation whenever it issues these permits. These section 7 consultation costs *are* considered in this section of the report.

Substantial uncertainty exists as to the number of private applicants who will receive an incidental *take* permits over the next 18 years. Preparing a successful HCP can take substantial amount of time and involve high costs depending on the size of the project and the impact to the species, so it is assumed that only large projects or projects that have a high probability of *taking*

the cave animals will attempt to obtain incidental *take* permits. Based on the information above, the following large projects may seek incidental *take* permits: two private road construction projects, eight resort/residential projects, and two commercial projects. Therefore, the Service may issue up to twelve incidental *take* permits over the next 18 years.

The number of incidental *take* permits may be lower if developers collaborate and prepare a regional HCP for part or all the proposed critical habitat. However, most of the planned projects have different timetables, so they may all elect to do individual HCPs. As a conservative estimate, it is assumed that the Service will issue twelve incidental *take* permits over the next 18 years.

Potential Project or Activity, next 18 years: Issuance of incidental *take* permits

Federal Involvement: Service

Consultations and Costs:

The Service will conduct a formal internal consultation and the applicants are not expected to be involved.

- Total Section 7 Costs: \$62,400

Estimate is based on (1) 12 incidental *take* permits in the next 18 years, (2) Low cost (from Table VI-1) of a consultation with a Federal agency as the Applicant, and (3) no biological surveys because the area will be surveyed as part of the HCP process.

Anticipated Project Modifications and Costs: None

In general, the protections to a species resulting from the HCP/incidental *take* permitting process would satisfy the section 7 standards because of the requirements that the *taking* not appreciably reduce the likelihood of survival and recovery of the species (the jeopardy standard) and that the impacts are minimized and mitigated to the maximum extent practicable. Therefore, additional project modifications attributable to the section 7 consultation process are not anticipated.

Potential Entities Impacted:

*Federal:* Service



## **4. INDIRECT COSTS**

### **4.a. Introduction**

Except for the protections provided by the Act as described in Chapter III, the Act does not provide other forms of protection for lands designated as critical habitat. And because consultation under section 7 applies only to activities that have Federal involvement, critical habitat designation does not afford any additional direct protections for listed species with respect to strictly private activities.

However, critical habitat designation has indirect impacts beyond those associated with the Act. For example, it is expected to provide the impetus for the Hawai'i State and county governments to require additional protections for designated critical habitat that would not otherwise be subject to such protections. In turn, these protections will affect the amount, types, and siting of developments occurring both within and outside critical habitat. In turn, critical habitat designation is expected to affect property values. These indirect impacts are discussed below.<sup>10</sup>

The estimate of indirect impacts is based, in part, on the assumption that on 12 new HCPs will be developed over the next 18 years, both within and outside of the boundaries of critical habitat. The possibility exists that as the local community becomes more familiar with the existence of these species and as information about the extent of caverns and mesocaverns increases, developers and other types of project managers may determine that individual projects are more likely to impact the species than previously imagined, even if the project is located outside of the boundaries of critical habitat. As a result, the proponents of these projects may be more likely to complete an HCP for protection against the accidental take of a species. As described in section 4.b.(3) of this chapter, an accepted HCP will increase the probability that developers will receive State and county approvals and permits, because reviewers will see that the Service and DLNR have accepted developer plans to conserve species. As a result, this analysis may overstate the indirect effects of critical habitat, as they relate to increased state and local regulation for landowners without a Federal nexus.

### **4.b. Impacts on Development**

Development is planned for much of the land within the proposed critical habitat. Section 2 above (Direct Costs) identifies the development projects in the proposed critical habitat that may be impacted directly by section 7 of the Act as it relates to the species listing and the proposed critical habitat designation. These development projects, and others, may also be impacted indirectly by one or more of the following: land redistricting by the State; county development

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<sup>10</sup> Because indirect costs reflect costs that are beyond those associated with the Act, they do not overlap with the direct costs discussed earlier.

approvals and permits; Habitat Conservation Plans (HCPs); and lost project financing. These are addressed below.

#### **4.b.(1) Redistricting of Land by the State**

As explained in Chapter IV, all the land in the State of Hawai'i is in one of five State districts: Urban, Rural, Agricultural, Conservation or Special. Chapter IV describes the projects, land uses, and activities permitted in each district and the limits placed on them. In general, the State places the fewest restrictions in the Urban District and the most restrictions in the Conservation District.

##### Redistricting to the Urban District

Most of the land in the proposed critical habitat that is planned for development is already in the Urban District. However, portions of certain projects—such as the Po'ipu Land development and several planned developments on Grove Farm land—are in the Agricultural District.

Based on current project plans, the following portions of planned developments in the proposed critical habitat will require redistricting from the Agricultural District to the Urban District before they can proceed: all of the hotel units, about 30 percent of the resort/residential units, 12 percent of the residential units, 80 percent of the commercial area, and all of the industrial area.

The State Land Use Commission (LUC) approves redistricting of all land in Hawai'i. LUC decision-making criteria for redistricting state: "In its review of any petition for reclassification of district boundaries ..., the commission shall specifically consider ... the impact of the proposed reclassification on ... [the] preservation or maintenance of important natural systems or habitats." (HRS §205-17). As explained in Chapter I, development can adversely impact the cave animals habitat by destroying caves and mesocaverns, increasing sedimentation in the caves, and reducing the amount of vegetation above the caves. Correspondingly, the LUC can be expected to seek comments from the Service on any proposed redistricting within designated critical habitat. This could, in turn, delay the redistricting process and the onset of development projects.

Depending on the recommendations the Service provides to the LUC on redistricting applications, the LUC may impose additional conditions on development projects; e.g., special landscaping and grounds maintenance, limits on the number and/or footprint of structures on development areas, etc. In addition, the LUC could require that developers meet certain conditions if a cave or cave animals are discovered during construction. Such conditions can increase costs, reduce the amount of development in the critical habitat, and reduce project revenues.

Or, the LUC could decide against redistricting a parcel in critical habitat from Agricultural to Urban, thereby leaving the developer to either abandon a planned project or change it markedly in order to conform to the more limiting conditions of the Agricultural District.

The LUC decides on redistricting applications on a case-by-case basis. Because, previous critical habitat designations in Hawai'i have not included large land areas planned for urban development, the LUC has not received applications to redistrict land in critical habitat from Agriculture to Urban. Correspondingly, uncertainty exists regarding the probable outcomes of future applications to the LUC for redistricting.

### Redistricting to the Conservation District

Private landowners are concerned that if their land is already in the Urban (or Agricultural) District, the State LUC may reclassify it to the more restrictive Conservation District if it has been designated as critical habitat by the Federal government. Such redistricting would eliminate the development potential for this land. Furthermore, since almost all the land in the proposed critical habitat is in the Urban and Agricultural Districts, including most of the undeveloped urban land in the Koloa District, redistricting would dramatically reduce future development of Koloa.

Landowner concern about potential redistricting of land in critical habitat to Conservation stems from State statutes for Conservation of Aquatic Life, Wildlife and Land Plants (HRS §195D) and the LUC (HRS §205):

- Protection of Hawai'i's Unique Flora and Fauna (HRS §195D-5.1)

DLNR "... shall initiate amendments to the Conservation District boundaries ... in order to include high-quality native forest and the habitat of rare native species of flora and fauna within the Conservation District."

- Districting and Classification of Lands (HRS §205-2(e))

"Conservation Districts shall include areas for conserving indigenous or endemic plants, fish and wildlife, including those which are threatened or endangered."

DBEDT's Office of Planning is responsible for conducting a periodic review of State District boundaries, commonly referred to as the "boundary review." During the boundary review, the Office of Planning considers whether the existing District boundaries are appropriate, taking into account current land uses, environmental concerns, and other factors. Critical habitat would prompt the Office of Planning to consider redistricting from the Agricultural, Rural or Urban Districts to the Conservation District (DBEDT, 2002).

Based on discussions with the Office of Planning and other considerations, such redistricting of privately owned land is likely to occur in only a limited number of cases. This assessment is based on the following:

- Critical habitat designation alone would not prompt the State to propose redistricting. A number of other factors would come into play, such as the quality of the native habitat, the value of the land as watershed, slopes, etc. (DBEDT, 2002).

Approval of redistricting requires affirmative votes from six of the nine LUC commissioners, with the decision based on a “clear preponderance of the evidence that the proposed boundary is reasonable” (HRS §205-4).

- Historically, private landowners strongly oppose proposals to redistrict their lands if they believe this might result in a lowering of their property values and/or a loss in the economic use of their lands. Furthermore, they may file lawsuits claiming an unconstitutional taking of property.
- In the last State District boundary review, just four privately owned parcels were redistricted to Conservation.

Critical habitat designations in the Urban and Agricultural Districts are relatively new in Hawai'i. And due to the cryptic nature of the cave animals habitat, it may be difficult to determine the quality of the habitat and establish a “clear preponderance of the evidence that the proposed boundary is reasonable.” However, since the cave animals are known to exist in certain areas, there is a risk that the LUC may reclassify land in the Urban and Agricultural Districts to the Conservation District.

If the LUC does not reclassify critical habitat to the Conservation District, one or more environmental organizations may challenge this in court. If such a lawsuit is successful, the land could be subject to court-ordered redistricting.

#### **4.b.(2) County Development Approvals and Permits**

In addition to State approvals and districting, developers must obtain certain approvals and permits from the County of Kaua'i. Depending on the location and nature of the development, the major county approvals and permits include:

- Amendment to the *2000 Kaua'i County General Plan*
- Zoning amendment
- Zoning permit
- Development and Use permit
- Special Management Area (SMA) permit
- Subdivision approval
- Grading permit
- Building permit

Before granting many if not all of these approvals and permits, county officials can be expected to send the development application to the Service for its comments and recommendations, even when there is no *Federal involvement*. In many cases, this will delay the approval process. And if the Service indicates that a project will have a negative impact on the habitat of listed species, then county agencies are likely to require project modifications to address the Service's concerns.

The cost of the project modifications will depend upon the circumstances. Potential modifications include reducing the size and/or density of a project, combined with planting and maintaining native plants for landscaping. And if a cave is exposed during construction, the developer may be required to seal and protect it.

#### **4.b.(3) Habitat Conservation Plans (HCPs)**

As mentioned in Section 2, some developers may elect to prepare Habitat Conservation Plans approved by the Service and DLNR. Although a preparation of HCP and obtaining an incidental *take* permit is not a direct section 7 impact, this analysis accounts for the possibility that the critical habitat designation will increase the sensitivity of the area within and even outside the boundaries of the critical habitat and therefore resulting in an increased tendency on the part of developers to prepare an HCP. Because of the various uncertainties in determining the number of private applicants who will receive an incidental take permits over the next 18 years, this analysis makes a conservative assumption that all 12 HCPs discussed in Section 3.q. above would be indirectly prompted by the designation. This will provide them with an incidental take permit, more explicit guidelines on required project modifications, and other conditions that can reduce their uncertainties as to their obligations with regard to the critical habitat. Furthermore, an accepted HCP will increase the probability that developers will receive State and county approvals and permits because reviewers will see that the Service and DLNR have accepted developer plans to conserve the species. Also, the incidental take permit reduces the risk of successful litigation to stop development on the basis of potential take of the cave animals. HCPs can be developed to include many projects (referred to here as a "regional HCP") or one project (an "individual HCP").

##### Regional HCP

In order to reduce the amount of uncertainty and risk of developing in the critical habitat, the State, the county, and private landowners and developers may choose to coordinate their efforts and prepare regional HCPs (one to meet Federal requirements and one to meet State requirements). Regional HCPs benefit the respective government agencies by allowing them to coordinate conservation efforts for the entire critical habitat, instead of addressing one development project area at a time.

A regional HCP for the cave animals would involve a large land area and many stakeholders. Because of this, it could take as long as 5 years or more, to complete (Service 2002). In addition to the time delay, the participants in the HCP process will need to expend considerable amounts of

time and money attending planning meetings, negotiating among themselves, conducting scientific surveys and studies, and implementing conservation measures. In some cases, an interim or short-term HCP may be developed to allow projects to proceed while the final or long-term Regional HCP is developed.

### Individual HCP

Some developers in the proposed critical habitat indicate that a regional HCP may not be feasible for them because of the immediacy of their projects and/or the time involved in coordinating with others. Based on their previous experience with other joint projects in Po'ipu, achieving the level of coordination required may not be realistic. In addition, some developments are projected to start construction in much less than five years. In these cases, developers may decide to proceed with individual HCPs, unless an interim regional plan is developed.

Since individual HCPs will cover smaller areas and include fewer parties, it will take 1 to 3 years to complete (Service, 2002). However, the cost per developer to prepare the HCP may be higher compared to the costs per developer to develop a regional HCP because of shared expenses in the regional process.

### HCP Requirements

Based on discussions with the Service and with landowners and developers, the HCPs may contain provisions that will require developers to modify their current plans by reducing or re-siting development areas or project footprints, altering construction techniques, reducing building densities, protecting and revegetating caves discovered during construction, etc. In addition, HCPs may require that some land in the critical habitat be set aside for long-term conservation of the cave animals. Obviously, such set-aside conditions will reduce the amount of development possible on a landowner's parcel.

### **4.b.(4) Project Financing**

Investors and lenders are required to finance the substantial up-front planning, permitting and construction costs of large development projects. Those financing the projects are likely to view the cryptic nature of the cave animals and their habitat, and possible project modifications as factors that make investing in development projects too risky, even if the project has received the necessary permits and approvals. Furthermore, potential investors may be deterred by the risk that litigation will require them to further protect the habitat for the cave animals. Even if litigation is unlikely to succeed, potential delays and high legal fees may pose unacceptable risks. Without financing, development projects will not proceed.

Because the cave animals listing and proposed critical habitat designation occurred relatively recently, investors and lenders have not had time to fully evaluate the uncertainties mentioned

above. Eventually, some projects may be abandoned because of the high risks. But some projects may proceed if the potential rewards are deemed to outweigh the risks.

In order to reduce their uncertainties,, landowners and developers will research the probability of discovering caves on their project sites. They can be expected to hire experts to examine the orientation of known lava tubes, conduct geological surveys of surface features, make test borings, etc. However, since mesocaverns as small as the Kaua'i cave amphipod (1/4 inch to 4/10 inch) could be *occupied*, it is impossible to eliminate all of the risk to development posed by critical habitat.

#### **4.c. Estimated Loss of Development**

As mentioned above, future development in the critical habitat is expected to be impacted indirectly by potential restrictions associated with State land districting, county developments and approvals, an HCP, and project financing. In order to analyze the economic impact of the proposed critical habitat on development, the amount of development is estimated through 2020 under a “Baseline Development” scenario (i.e., no listing and no critical habitat). Then the potential impacts on the Baseline Development that are attributable to the listing and to critical habitat are examined.

##### **4.c.(1) Baseline Development**

Table VI-3 summarizes the amount and types of development that are likely to occur within the proposed critical habitat (“CH” in the table) between 2003 and 2020. The information is based on the 2000 *Kaua'i County General Plan* (the *General Plan*) and on discussions with several landowners and developers. The planning for the majority of these development projects occurred before the cave animals were listed as endangered species in 2000, and before the proposed rule for the critical habitat was published in 2002. Accordingly, it is assumed that the projected development represents the development that would occur with the Baseline Development scenario.

Some developments in the Baseline Development scenario are not reflected in the *General Plan*. Thus, even without the species listing and a critical habitat designation, these projects may not occur due to community opposition or other difficulties in obtaining approvals. In view of this uncertainty, this analysis presents two separate projections of Baseline Development. The Low projection includes only the development that is included in the *General Plan*. The High projection includes all the planned development—whether it is in the *General Plan*, or more recently envisaged by developers but not in the *General Plan*. The *Plan* is updated about every 10+ years, but some projects may be added before the update.

The number of units shown in Table VI-3 reflect the fact that project components outside critical habitat could be lost due the cave listing and critical habit designation. This would happen if an essential project component cannot be built as planned within critical habitat, so must be relocated outside critical habitat. Examples of essential components include wastewater treatment

plants, school sites, and community parks as required by State or county development approvals. Since a development project cannot proceed without these essential components, they will have to be built outside critical habitat. This, in turn, could reduce the number of housing units that can be built outside critical habitat.

In order to account for the potential loss of units due to this “domino effect,” the unit counts in Table VI-3 include both the number of units planned in critical habitat, and the number of units outside critical habitat that would be lost if an essential project component had to be moved outside the critical habitat. The number of units was estimated by calculating the acreage of each essential project component planned in critical habitat, and multiplying it by the average density of units for the nearby areas outside critical habitat. Therefore, the number of units in Table VI-3 reflects the number of units that could be lost both inside and outside critical habitat if no development was allowed in critical habitat.

As shown in Table VI-3, most of the planned development involves the hotel and resort/residential markets. The number of hotel rooms ranges from zero to 190, and the number resort/residential units ranges from 1,770 to 2,250. In addition, approximately 640 residential units are planned in both the Low and High projections. The proposed critical habitat also contains areas planned for commercial development (4 to 19 acres) and industrial development (zero to 24 acres). In addition to the two existing 18-hole golf courses in the proposed critical habitat, the equivalent of one or two more 18-hole golf courses are planned, for a total of three or four golf courses by 2020.

#### **4.c.(2) Potential Change in Baseline Development**

The cave animals listing and critical habitat designation is expected to reduce development below the level projected for the Baseline Development. In the “Listing and CH” projection, it is assumed that the cave animals are listed and critical habitat has been designated. This projection is compared to the Baseline Development to determine the probable change in the amount of development and the associated economic impacts by 2020.

However, considerable uncertainty exists regarding the impact of the listing and critical habitat designation on future development in Koloa. This uncertainty reflects the lack of actual government and developer experience for these cave animals, and uncertainty about the following:

- the underground cave structure
- underground areas that will be discovered to be occupied by the cave animals
- project modifications and mitigations that will be recommended by the Service
- changes in development approvals by the State and county
- development conditions that will be imposed by the State and county
- requirements specified in HCPs
- added development costs and delays



- risks of litigation to block development because of the listing and critical habitat designation
- reactions by investors and lenders over real and perceived risk of development.

Based on the above uncertainties and on discussions with landowners, developers, project investors, State and county officials, geologists, biologists, building contractors and civil engineers, the estimated impact of the cave animals listing and critical habitat designation is likely to reduce the Baseline Development scenario in the order of 25 to 50 percent. However, an impact outside this range is possible.

Based on these percentages, Table VI-3 presents High and Low projections of development with “Listing and CH.” For example, the Baseline Development scenario under the Low Projection shows about 569 oceanfront multi-family units, while the “Listing and CH” scenario projects 427 units—a decrease of 142 units (25 percent) from the Baseline Development scenario. A similar relationship exists for the High Projection (the second page of the table), except that the loss is 410 units (50 percent) in the “Listing and CH” scenario.

In view of the underlying uncertainties, the projections in Table VI-3 should be interpreted as order of magnitude estimates, even though the entries show greater precision.

#### **4.c.(3) Critical Habitat vs. Island-wide Development**

In addition to the decrease in development in the critical habitat, Table VI-3 also shows the island-wide change in development. This distinction is made because some of the planned developments are likely to be profitable only if they are sited in the proposed critical habitat, while others could possibly relocate to other areas on the island.

In particular, Po'ipu offers a unique combination of assets for tourism development on Kaua'i (see Chapter II, Section 3.b.(4)). Because of these unique assets, it caters to different visitor and resort/residential markets than visitors drawn to the other resort areas on Kaua'i. The closest comparables are the resort areas on Maui and in West Hawai'i (i.e., the west side of the Big Island of Hawai'i). Furthermore, no land remains in Koloa outside the proposed critical habitat that is suitable for resort/residential development except Kukui'ula owned by A&B. However, Kukui'ula is already in the early stages of development. Also, the other resort areas on Kaua'i generally do not have the development approvals or space to accommodate the amount of development that could be displaced from Po'ipu.

Thus, hotel, resort/residential, and related golf-course development projects that are displaced from the Po'ipu area not likely to be replaced by equivalent projects elsewhere on the island.

In contrast to the hotel and resort/residential markets, the markets for residential housing and commercial and industrial development can be supplied outside the proposed critical habitat in other parts of Koloa, Lihu'e, and elsewhere on Kaua'i. Assuming demand stays constant, any residential, commercial, and industrial development that does not occur in the proposed critical habitat will probably relocate elsewhere on Kaua'i.

However, the demand for new residential, commercial, and industrial projects will be reduced due to less hotel and resort/residential development and, as a result, less island-wide economic and population growth. This reduction in demand for new residential, commercial, and industrial projects is shown in Table VI-3, although the estimates come from Table VI-4.

#### **4.d. Costs and Delays for Successful Projects**

Table VI-4 summarizes the lost economic activity associated with unrealized development in the critical habitat, but not the additional costs and delays associated with successful development there. These are discussed below.

##### **4.d.(1) Environmental Reviews**

As discussed above, development projects in the critical habitat are likely to undergo an additional layer of environmental review involving additional studies and surveys. These reviews could stem from a variety of actions; e.g., attempts by developers to reduce their uncertainties about the locations of caves and mesocaverns, county SMA or other permitting requirements; contesting potential LUC redistricting decisions; responding to lawsuits, etc. A considerable amount of uncertainty exists as to the extent of effort that will be required for these efforts. However, it is reasonable to assume that all development projects in critical habitat—both those which are approved and those which are denied—will contract for some scientific studies and/or undergo more review than would otherwise be required.

- Total Section 7 Costs: \$108,000 to \$440,000

Environmental review may involve meetings, written correspondence, and phone calls with and among the Service, State or county agencies, the developer, attorneys, other consultants, etc. Since these are the same types of activities that are associated with a section 7 consultation, the costs are assumed to be similar. In addition, the environmental review may require additional biological or geological studies and surveys. The cost of these studies is assumed to be similar to the cost of a biological survey for a section 7 consultation. About 15 or 20 separate development projects are currently being planned within the proposed critical habitat. Thus, the total cost of environmental review and studies is projected to range between \$108,000 and \$440,000 (based on a Low to Medium cost of a section 7 consultation and the cost to survey a small to medium-sized parcel (see Section 2.b. at the beginning of this chapter).

#### **4.d.(2) Litigation**

Developers could face considerable legal fees if lawsuits are filed against their project. However, it is not known which projects, if any, will be subject to litigation, and how much time and effort will be required to resolve the legal problems. Because there is too much uncertainty in the actual likelihood of this scenario, the costs are not estimated.

#### **4.e. Residential, Commercial and Industrial Development**

For certain projects that could be lost due to the cave animals listing and critical habitat designation, demand could still be supplied by projects outside the critical habitat. This generally applies to residential, commercial, and industrial development. Accordingly, some landowners and developers outside critical habitat may gain because of lost development in critical habitat. To a limited extent, some large landowners could be both gainers and losers, although their losses are likely to far exceed their gains. But from the perspective of landowners and developers who have projects in critical habitat, the losses could be significant—losses that are not captured in Table VI-4. Examples are discussed below.

##### **4.e.(1) Po'ipu Shopping Village**

The owners of Po'ipu Shopping Village hold an option for a 6-acre expansion of their shopping center and have, to date, invested on the order of \$1 million in time and money for project planning, environmental studies, engineering studies, obtaining development approvals, etc. Critical habitat designation creates uncertainties about the increased costs and risks of development, and is expected to make it difficult for them to obtain project financing. Thus, there is a substantial risk that the developers will lose their past investment, as well as future profits due to critical habitat designation.

##### **4.e.(2) Old Koloa Mill**

Grove Farm plans to upzone the old Koloa Mill site to industrial use, and expand the project to include 24 acres in the proposed critical habitat. There is no other industrial land in the area to serve Koloa Town and Po'ipu.

##### **4.e.(3) Redevelopment, Koloa Town**

In drawing the boundaries of the proposed critical habitat, the Service excluded nearly all the residential areas in Koloa Town and Po'ipu. However, a number of small, older homes on small parcels in the southern portion of Koloa Town west of Hapa Road were included in the proposed critical habitat. Although these homes are in the Agricultural District, this land is in residential use.

Although, critical habitat designation will not impact the homes in their current configuration, most of them will eventually be rebuilt, since many of them are old. Also, some families plan to build additional homes on their properties for their grown children.

Critical habitat designation could result in significant adverse impacts on these property owners. Because of the small sizes of the parcels, many of the landowners lack the flexibility to site new homes in the event that cave habitat are discovered. Also, many of the families may lack the financial resources necessary to address government-imposed conditions stemming from critical habitat designation. Finally, any losses these families suffer in property values may have a large proportional economic affect on them, since their homes are probably their primary family investments.

#### **4.e.(4) Weliweli Housing Project**

The State plans a 400-unit expansion of its Weliweli affordable-housing project on 75 acres of State land in the proposed critical habitat. However, no specific plans or schedule have been developed. In view of the anticipated economic and population growth in Koloa, and the high prices of market housing in the area, there will be a need for a project such as Weliweli that provides affordable housing to residents working in the Koloa area.

#### **4.f. Agriculture**

The proposed critical habitat for the cave animals affects approximately 3,096 acres in the Agricultural District, most of which is owned by Grove Farm. As mentioned in Section 2 (Direct Costs) above, some of this land is used to grow coffee, seed corn, and other diversified crops, but most of it is in grazing, which is a relatively low-value use of the land.

The critical habitat designation could have an indirect impact on the use of land in agriculture. By the year 2020, slower economic and population growth as projected in Table VI-4 would reduce the demand for island-grown produce, resulting in: (1) an estimated 29 to 81 fewer acres planted in crops on Kaua'i than would be the case with the Baseline Projection; and (2) four to ten fewer farmers. These estimates are based on 10 acres of cropland per 1,000 residents and visitors, and one farmer per 8 acres.

Also, mandated modifications to farm practices to reduce threats to the cave animals could encourage farmers to located outside the critical habitat. A more extreme possibility would result from State redistricting of land in critical habitat from the Agricultural District to the Conservation District, possibly as a result of a court order. In this case, farming would no longer be permitted in critical habitat. However, due to the release of land from sugarcane cultivation, an ample supply of good crop land is available outside the critical habitat. Thus, critical habitat could affect which lands are farmed. If current or future farming is displaced from critical habitat, some of the farms may locate on other lands owned by Grove Farm.

**4.g. Indirect Effects on Underground Storage Tanks (USTs)**

As discussed in Section 2 above, as many as five underground storage tanks (USTs) could be installed in the proposed critical habitat over the next 18 years. The USTs would be associated with three golf courses, a hotel, and possibly a gas station. However, due to concerns about destroying habitat for the cave animals, the tanks may have to be constructed above ground.

A local construction firm that specializes in installing fuel tanks indicates that it is often less expensive to install a tank above ground. Underground tanks require sophisticated leak-detection systems regulated by the EPA, special construction to avoid leaks, and remediation if leaks occur. Also, because the critical habitat contains thin soils and shallow lava rock, expensive blasting and excavation would be required to install the USTs. Most of this could be reduced or avoided by installing above-ground tanks (Convault Hawai'i, 2002).

Gas stations have relatively large tanks, and may not have enough space on their property to accommodate above-ground tanks. However, as mentioned above, there are other commercial areas in Koloa and elsewhere on Kaua'i where a gas station could be built. Also, these areas are likely to have thicker soils, so installing underground tanks is likely to be less expensive. It is therefore assumed that, due to the indirect impacts of the cave animals listing and critical habitat, no USTs will be installed in the proposed critical habitat. However, installing the tanks above ground or outside the proposed critical habitat is not likely to involve significant additional costs.

**4.h. Habitat Conservation Plans**

The preparation of a regional HCP or individual HCPs will involve costs to private landowners and/or developers; the Service, and possibly to other Federal agencies; DLNR, and possibly other State agencies; and the county. The Service indicates that preparing an HCP is similar to preparing an EIS because both must identify impacts to endangered species, list any measures that will be implemented to avoid adverse impacts, list planned restoration efforts, identify alternatives to the proposed project, etc.

To date, just one Federal HCP that has been completed in Hawai'i, and the Service indicates that the cost of preparing it may not be typical because the applicant also addressed conservation measures unrelated to endangered species. Therefore, it is assumed here that the cost of preparing an HCP will be similar to the cost of preparing an EIS.

- Total Section 7 Costs: \$3.9 to \$7.3 million

A local planning firm indicates that the cost to a private applicant of preparing a comparable EIS ranges from \$100,000 to \$200,000. The Service indicates that their involvement in the HCP process requires two to four person-months of a staff biologist's time. Assuming 22 working days

a month at a staff biologist's rate of \$720 per day (including overhead), the total cost to the Service is \$31,700 to \$63,400.

In addition, Hawai'i State law requires a State HCP before a State incidental *take* permit is issued. Although elements in the Federal HCP can be used in the State HCP, State law requires the applicant to also demonstrate a net benefit to the species, which may require the applicant to expend additional funds and effort. As with the Federal HCP process, only a few State HCPs have been completed. Therefore, it is assumed here that the State HCP process will cost the applicant an additional 50 percent of the cost of preparing the Federal HCP. Also, it is assumed the State will incur costs similar to those incurred by the Service.

Thus, the total cost of preparing the State and Federal HCPs is estimated at about \$210,000 to \$430,000. The time required to obtain the HCPs can exceed three years.

As mentioned in Section 2 and 4.b.(3) above, twelve projects over the next 20 years may prepare HCPs. These projects include two private-road construction projects, eight resort/residential projects, and two commercial projects. This number could be lower if developers collaborate to prepare a regional HCP. However, in order to present a conservative estimate of the total costs, it is assumed that all twelve projects will prepare individual HCPs. Thus the cost is estimated at between \$2.5 million and \$5.2 million.

In order to reduce adverse impacts on the cave animals and their habitat, HCPs are likely to contain some or all of the project modifications discussed in Section 2.b.(4). The costs associated with these project modifications for the resort/residential and commercial development projects are shown in Table VI-5. To avoid double-counting, these costs are not repeated in this section.

For the two private-road projects on Grove Farm land, the project modifications are likely to be similar to those discussed in Section 3(h), New Roads. The roads, which will be about 1.5 and 2.1 miles long, will replace existing cane-haul roads, and cover areas that were used for sugarcane production. These roads will cover the same general area as the planned Po'ipu-Kipu connector project. Based on the assumptions for the Po'ipu-Kipu connector road (Table VI-2), and the road lengths of 1.5 and 2.1 miles in critical habitat, the total HCP project modification cost is expected to range from \$1.4 to \$2.1 million.

#### **4.i. Contesting Redistricting**

As indicated above, it is possible that the State will propose redistricting land in the Urban and Agricultural Districts to the Conservation District if the land is in critical habitat. It is also possible that an environmental organization will file a lawsuit to force the State to redistrict the land. Even if these efforts do not result in redistricting, the effort to contest a pending redistricting action or a lawsuit can be time-consuming and costly for landowners. During the last State boundary review, some landowners report having spent over \$50,000 to contest proposed redistricting actions.

Redistricting of land in Koloa would have very high costs in terms of lost property values (especially for land in the Urban District) and lost profits from future development. Also, redistricting could affect as many as 76 landowners in the proposed critical habitat. Given the number of landowners and the value of future development in Koloa, a high expenditure would be warranted. Therefore, it is expected that, as a group, landowners would spend at least a million dollars on legal fees to contest proposed redistricting of their land. This cost estimate covers the effort to fight a potential lawsuit to redistrict the land, including appeals to higher courts, and involving attorneys and experts for multiple landowners, a few environmental organizations, and possibly the State and the county.

#### **4.j. Land Management for Conservation**

Private and public landowners have expressed concern that they will be required to alter the management of their lands that fall within the designation so as to assure the survival and conservation of listed species, regardless of whether they plan to propose any changes to land uses or activities in the future.

Specifically, some landowners are concerned that critical habitat designation could interfere with existing and planned activities within proposed critical habitat. Landowners have also expressed concern that, in addition to putting a halt to existing and planned activities, critical habitat designation could result in the imposition of new management obligations, such as the construction of fencing, the removal of feral ungulates, or the removal of noxious weeds. Some landowners have expressed concern that this new obligation will be expensive and they will have to pay most or all of the costs that may be associated with managing the land to assure survival and conservation of the species.

Finally, some landowners have expressed concern over the possible loss of discretion over their land management practices. Specifically, there is concern that beneficial land management practices voluntarily adopted in the past may become mandatory without regard to either the economic impact, the actual benefits associated with the practice, or the role of these management practices in their ongoing operations.

Discussed below are the existing and potential obligations under the Act associated with this type of land management, management activities that would enhance the survival and conservation of the moth, and the estimated costs of such management activities.

#### **4.j.(1) Requirements for Conservation Land Management**

##### **Existing Federal Requirements**

Section 7 of the Act by itself does not require landowners to manage their lands to protect critical habitat, assure the survival and conservation of listed species, or participate in projects to

recover species for which critical habitat has been established. That is, critical habitat designation, by itself, does not require any landowner to: (1) create any reserve, refuge, or wilderness areas; (2) fence for any reason; (3) remove ungulates, rodents, or weeds; (4) close areas to hunters or hikers; (5) initiate conservation projects; or (6) prepare special land-management plans.

Instead, it requires only that a Federal agency that provides funding or permits for any activity that may affect the designated area must consult with the Service to insure that the activity is not likely to jeopardize the continued existence of any endangered or threatened species or result in the destruction or adverse modification of habitat of such species.

#### Existing State Requirements

Under existing State law, a Federal designation of critical habitat does not subject the land to additional State requirements to proactively manage the land to conserve listed species. In fact, Hawai'i's endangered species law (HRS § 195D), does not mention "critical habitat" although it does mention "habitat."

#### **4.j.(2) Potential Requirements: Court Ruling on *Taking***

Even though there are no direct requirements under Federal or State law to proactively manage lands to protect critical habitat or conserve listed species, some landowners speculate that, pursuant to litigation, a Federal or State court might mandate conservation management of privately owned land in critical habitat. The legal decision would be based on an interplay among the Act, the State's endangered species law, and various State laws and State Administrative Rules that protect the ecosystems of threatened and endangered species (see Chapter IV for more detail on these State requirements).

Under Federal and State law, prohibited activities include the *taking* of any wildlife species (see Chapter IV and HRS § 124). If a court finds that an action degrades critical habitat to an extent where it significantly impairs essential behavioral patterns of the species, such as breeding, feeding, and sheltering, this action could constitute a *take* of the moth, regardless of whether an individual moth would be harmed directly by the proposed action (i.e., the action could harm a portion of the habitat of the moth, but not the moth itself). Because the point where an activity disturbs habitat sufficiently to constitute a significant impairment of essential behavioral patterns of the species is unclear, landowners fear that their actions could unintentionally amount to an illegal *taking*. All projects and activities could be covered, regardless of *Federal involvement*. For example, clearing land of native host plants in preparation for a housing project could be viewed as an activity that degrades critical habitat and therefore constitutes a *taking* of a listed species. This argument is similar to the one that was used successfully in Federal court to order the eradication of sheep and goats on Mauna Kea to protect the critical habitat of the endangered *palila* bird, discussed earlier in this Section and in Appendix VI-A.



#### Application to Critical Habitat

As noted above, the precedent set in the *palila* case exists as a potential requirement for private landowners. For example, in a case brought under the Act, a court might mandate conservation management of privately owned land in existing habitat and/or Federally-designated critical habitat based on the argument presented in the *palila* case. The effect of the proposed critical habitat designation could be to expand and define more precisely the geographic extent of habitat that could be the subject of such a court decision.

In the event that a case is brought under State law, landowners speculate that State agencies or a State court might interpret various State Administrative Rules and State laws that protect "ecosystems" of threatened and endangered species to mean protection of the "critical habitat" of these species—even though "critical habitat" is not mentioned in State laws. As a result, the proposed critical habitat designation could expand and define more precisely the areas that might be affected by State court rulings.

#### Application to Critical Habitat

As noted above, the precedent set in the *palila* case already looms as a potential requirement for private landowners. For example, in a case brought under the Act, a court might mandate conservation management of privately owned land in existing habitat and/or Federally-designated critical habitat based on the argument presented in the *palila* case. For this situation, the effect of the proposed critical habitat designation could be to expand and define more precisely the geographic extent of habitat that could be the subject of such a court decision.

In the event that a case is brought under State law, landowners speculate that State agencies or a State court might interpret various State Administrative Rules and State laws that protect "ecosystems" of threatened and endangered species to mean protection of the "critical habitat" of these species—even though "critical habitat" is not mentioned in State laws. As a result, the proposed critical habitat designation could expand and define more precisely the areas that might be affected by State court rulings.

#### **4.j.(3) Conservation Management to Protect Cave Animals**

As indicated in Chapter I and in the proposed rule, the major threats to the cave animals derive from the destruction or breaching of caves and mesocaverns, a lack of perennial surface vegetation above caves, sedimentation in the caves, changes in airflow, light penetration, introduced chemical and biological control organisms, human visitation, and fire.

In response to these threats, management actions needed to assure the conservation of the cave animals involve closing existing cave openings to restrict unauthorized access, and planting and irrigating native vegetation above caves and mesocaverns.

#### 4.j.(4) Costs of Conservation Management Activities

The cost of implementing the above management actions will depend on the circumstances: the number of caves to be protected, the area being managed, the quality of the native vegetation, the extent of weeds, the risk of fire, land-management goals, etc.

As detailed in Section 2 above, the cost of installing tamper-resistant grates across cave openings, and restoring the area above caves is estimated at \$300-\$500 per acre. This cost is based on protecting approximately two caves with surface openings per 100 acres.

However, as explained in Chapter I, caves are located throughout Koloa, and most sealed caves that have not filled with sediment are probably occupied. Thus, in an extreme case, a court could mandate that all the proposed critical habitat be managed proactively for the endangered cave animals.

Most of the proposed critical habitat is under agricultural land. Because many agricultural crops and grasses do not have long roots (NRCS, 2002), it is possible that by planting native trees on this land, the value of the habitat for the cave animals will be enhanced. A local landscaping company indicates the cost of clearing the grasses and weeds common on this land would be approximately \$0.25 per square foot, or \$10,900 per acre (Kaua'i Nursery and Landscaping Inc., 2002).

Most of the remaining areas in the proposed critical habitat are already covered with a dense growth of non-native plants, mostly *kiawe* (*Prosopis pallida*). The Service indicates that it is not known whether *kiawe* is a potential food source for the cave animals. Thus, if a court rules that proactive management is required, the Service indicates that it would suggest that *kiawe* trees be removed and replaced with native plants. Uprooting the *kiawe* trees could damage the cave structures underneath and remove a potential food source for the cave animals. And use of herbicide to kill the *kiawe* could travel through the root system and enter the cave systems. It is therefore likely that the *kiawe* trees would have to be cut and each stump ground down to below the ground surface to prevent regrowth. Due to the dense nature of the vegetation, the cost of this type of clearing activity could range from \$1 to \$2 per square foot, or roughly \$43,600 to \$87,100 per acre (Kaua'i Nursery and Landscaping Inc., 2002).

In past conservation agreements, the Service recommended planting one native tree every 50 feet. Using this same distance, one acre of land would require approximately ten evenly spaced trees. Landscapers on Kaua'i indicate that it would cost about \$175 per tree to plant native trees such as '*ohi'a*', '*milo*', and '*a'ali'i*' in the Koloa region. The nurseries on Kaua'i also indicated that they may not have a large enough supply of native plants to cover such a large area. If this turns out to be the case, seedlings would have to be shipped in from Big Island nurseries. Shipping and handling fees are approximately \$1 for a seedling and \$5 for a 3-foot tree (Lehua Lena Nursery, H Euniece

Nursery Inc., and Young Brothers, Ltd., 2002). Assuming all the trees used are 3-foot trees shipped from the Big Island, the cost to plant them would be \$1,800 per acre ( $\$175 + \$5 \times 10$  trees per acre).

Additional costs for hand-watering (if drip irrigation is not available), monitoring, weeding, fertilizing, and shaping until the trees are established are estimated at \$1,440 to \$3,600 per acre, based on ten trees per acre (Kaua'i Nursery and Landscaping Inc., 2002). Thus, the expected cost to restrict unauthorized access to caves, revegetate the area above caves, clear non-native vegetation, and plant native trees is \$14,440 to \$16,800 per acre for agricultural land, and \$47,100 to \$93,000 per acre for land overgrown by *kiawe* and other non-native plants.

Government cost-sharing programs are available to fund conservation projects (see Chapter IV), but current government funding is inadequate to support such projects for all the lands in Hawai'i that are being proposed for critical habitat.

#### **4.j.(5) Potential Cost of Conservation Land-Management Due to Critical Habitat**

In summary, an undetermined probability exists that a Federal or State court could mandate conservation management of land designated as critical habitat. However, it is beyond the scope of this economic analysis to assess the legal merits of the above arguments, or the probability that one or more lawsuits would be filed and, if filed, to identify possible outcomes of court decisions and the associated probabilities.

But assuming that conservation management is mandated, then the cost to landowners would depend on the amount of agricultural land and overgrown land that will remain undeveloped. Currently, approximately 2,745 acres of agricultural land and 880 acres of overgrown land in critical habitat could be subject to conservation management. These figures exclude existing golf courses. Using the per-acre cost estimate given above, the total cost could range from \$39.6 million to \$46.1 million for agricultural land, and \$41.5 million to \$81.8 million for overgrown land. Thus the total cost amounts to between \$81.1 million and \$128 million.

Since almost all of the proposed critical habitat is privately owned, it is likely that almost all of this cost would be borne by private landowners. The related increase in economic activity due to conservation land management is addressed in Section 6.f. of this chapter.

#### **4.k. State and County Environmental Review**

Based on discussions with planning consultants and government officials, critical habitat designation will expand the scope of environmental analyses, since State and county agencies will require developers to address the impact of their proposed projects on critical habitat and related public concerns.

Subject to certain exemptions, a State Environmental Assessment (EA) or Environmental Impact Statement (EIS) is required for projects that: (1) use State or county lands or funds; (2) are in the Conservation District; (3) are in the Shoreline Setback Area (usually 40 feet inland from the certified shoreline); (4) require an amendment to the *General Plan* that would designate land to some category other than agriculture, conservation or preservation; or (5) involve reclassification of State Conservation District lands. If a project "...substantially affects a rare, threatened, or endangered species, or its habitat," then a State EIS might be required instead of the simpler and less expensive EA.

It is reasonable to assume that the term "habitat" (which, in Hawai'i, includes areas that support listed threatened and endangered species) may eventually be interpreted by decision-makers to include "critical habitat" (which may include areas that could support listed species but presently do not). Those arguing in favor of this interpretation would include environmental groups, those who oppose development, and possibly some government agencies. Eventually a developer may elect, or be required to submit a State EIS based on the fact that a project is located in critical habitat. Once the precedent is set, succeeding developers in similar circumstances may be required to submit State EISs. Moreover, a court may interpret "habitat" to include "critical habitat."

If critical habitat designation results in a requirement for a State EIS instead of an EA then, depending upon the complexity of the project, this could cost \$25,000 to \$75,000 more than an EA (based on estimates from Hawai'i planning firms, 2002). Also, preparing and processing a State EIS would take about two months or more than an EA. In addition, biological surveys could be required.

Thirteen development projects in the proposed critical habitat may require an EA: five may require an amendment to the *General Plan* that would designate land to some category other than agriculture, conservation or preservation; one State-funded housing project; five State- and county-funded road projects; and two county-funded wastewater treatment plants. If all these projects subsequently require EISs, the total cost to prepare them will be between \$325,000 and \$975,000 (13 x \$25,000 and 13 x \$75,000). Most of these projects will require a survey as part of a section 7 consultation or other environmental review, so survey costs are not presented here to avoid double-counting.

#### **4.1. Reduced Property Values**

##### **4.1.(1) Concern about Reduced Property Values**

An issue often raised by private landowners, and closely related to much of the previous discussion, is that landowners' property may lose value. They are concerned that the critical habitat designation will make their land less desirable by restricting its potential use, increasing land-management costs, limiting development potential, increasing development costs, or delaying development.

The market value of a property reflects the future time-stream of economic and other benefits (e.g., profits) anticipated by potential buyers and sellers of land. Thus, factors which affect the future time-stream of benefits will affect the property values. For example, even partial approval of development can increase anticipated benefits and the timing of these benefits, thereby increasing property value. On the other hand, restrictions on land use, higher land-management costs, limits on development potential, higher development costs, and delayed development will adversely affect the anticipated stream of benefits, thereby reducing the property value.

Reduced property values may be based on facts and an accurate assessment of the implications of critical habitat. But even perceptions of the economic impact of critical habitat designation can result in a loss of property value if landowners or buyers believe that the designation will cause significant changes in the stream of benefits. Such a loss in property value will be experienced for as long as the perceptions persist.

Similarly, uncertainty about the impact of a critical habitat designation can contribute to a reduction in land value that will continue until clear and correct information is distributed. To reduce the uncertainties, landowners may feel it necessary to retain counsel, land surveyors, biologists, geologists, and other experts to determine the implications of the designation on their property (see below). This can be particularly serious for landowners who plan to sell their property and so must address concerns of potential buyers. For the cave animals, elimination of uncertainty is difficult because of their underground habitat.

#### **4.1.(2) Assessed Values and Market Values**

The Kaua'i County Department of Finance assesses annually the property values of parcels on Kaua'i. For most parcels, this assessment is the county's estimate of the market value of the property. However, parcels with a dedication for agricultural use are assessed using potential future economic benefits associated with agriculture, and do not include the potential economic benefits of development, which are significantly higher. Thus, the assessed value of agricultural land usually does not reflect its market value.

Also, the county relies on recent sales of comparables to estimate market values. Since some properties do not change hands often, little data may be available upon which to base the market price. In particular, a landowner may have prepared development plans for a parcel, and may have obtain a number of development approvals and permits. Sales transactions for comparable properties rarely exist for such parcels. In these situations, the market value of the parcel may be much higher than its assessed value—possibly over twice the assessed value. This is in fact the case for a number parcels in the proposed critical habitat.

In some cases, well researched and recent property appraisals may be publicly available. But in most cases, the county's property assessments are often the best information available on market values.

#### **4.1.(3) Potentially Affected Acreage**

The concern of landowners about reduced property values in the proposed critical habitat primarily involves land that is: (1) privately owned; (2) in the State's Urban, Rural or Agricultural Districts; (3) suitable for eventual development or commercial use based on access, gentle slopes, proximity to infrastructure and services, etc.; and (4) not already developed at its highest and best use.

Taking into account the above factors, the property values for almost all the privately owned land in the critical habitat that is in the Agricultural and Urban Districts could be affected. Excluding parcels that do not contain the *primary constituent elements* for the cave animals, and excluding parcels that are currently developed at their highest and best use, the total amount of land that could be affected is about 3,433 acres: about 515 acres in the Urban District and about 2,918 acres in the Agricultural District.

Based on the county's 2000 assessed land values, the total assessed value of this land is \$67.2 million. In cases where parcels are not contained entirely within the critical habitat, it is assumed that a property value is distributed evenly across the entire parcel. Given the fact that development plans exist on many parcels, and the fact that assessed values for agricultural land may not reflect market values, it is assumed that the market value is about double the assessed value, or about \$134.4 million.

#### **4.1.(4) Change in Property Values Due to the Listing and Critical Habitat**

It is expected that the listing and critical habitat designation will alter the amount of development that can occur in the proposed critical habitat. In turn, this will reduce the potential stream of future economic benefits to landowners, and reduce current property values.

Uncertainty exists as to how many development projects will not proceed because of the uncertainties about the location of underground caves; which ones are *occupied*; how investors and lenders will react to this uncertainty; project modifications required by the Service; etc. However, as discussed in Section 4.c., it is assumed that the listing and critical habitat designation will reduce development by 25 to 50 percent. If these same percentages are applied to potential losses in future economic benefit to the land parcels in critical habitat, then the property values can be calculated.

Based on adjusted assessed value, the loss in property value due to the listing and critical habitat designation is about \$34 million to \$67 million. Given the uncertainties about critical habitat, it is anticipated that the higher figures more accurately reflect the perception of buyers and sellers of property.

An alternative approach that may better reflect the perception of property owners is to use the stream of after-tax profits and commissions from property sales shown in Table VI-5, and adjust

these figures to remove projects that are not approved in the *General Plan*; remove sales commissions (less 25 percent); add profits that flow to organizations outside Kaua'i (add 100 percent); and apply a higher discount rate that reflects development risks (8 percent). For these assumptions, the loss in property value due to the listing and critical habitat designation is about \$36 million to \$72 million. As before, it is anticipated that the higher figures more accurately reflect the perception of buyers and sellers of property. Furthermore, these figures do not include the loss in value of agricultural land that would become more difficult to develop.

Property values may also be decreased by potential delays in development approvals, additional costs to comply with conditions set forth in various environmental reviews, concern about conservation management for the cave animals, and the other costs discussed in this section. However, with a more restrictive land supply in critical habitat, developers may adjust their product to target the higher-end markets by having more open space and lower-density construction, and higher quality construction. The two effects of restrictive land supply and a more expensive product will tend to offset one another.

Finally, it should be noted that some of the loss in property value partially double-counts the loss in income benefits summarized in Block 8 of Table VI-5, since both the property values and the income benefits reflect a lost stream of profits from development and property sales.

#### **4.m. Condemnation of Property**

Some landowners suspect that, after critical habitat is designated, the Service will eventually condemn private property at depressed land values. However, the Service is not proposing nor is it contemplating purchasing land being proposed for critical habitat.

On occasion, the Service does purchase land (e.g., land for a wildlife refuge). But this would be a separate action from critical habitat designation. As such, any proposed land purchase should be evaluated at the time it is proposed, and should be based on what is actually proposed. When the Service does purchase private property, the normal practice is to do so only when (1) the landowner is willing to sell the land, and (2) the price and other terms are acceptable to the landowner.

#### **4.n. Costs to Investigate Implications of Critical Habitat**

Many of the private landowners may hire attorneys or use their own professional staff to investigate the implications of critical habitat designation on their property. They may want to learn how the designation may affect (1) the use of their land (either through restrictions or new obligations), and (2) the value of their land.

A total of 76 private landowners are in the proposed critical habitat. While some of them own extensive acreage in Hawai'i and are familiar with the Act, this analysis assumes that all of them will investigate the potential impacts on their properties.

- Total Section 7 Costs: \$225,000 to \$526,000

This cost is based on the following assumptions: (1) about six of the major landowners and their consultants will spend an average of 100 to 160 hours investigating the implications of critical habitat; (2) about 50 of the remaining landowners will spend an average of 15 to 25 hours investigating the implications; (3) professional rates are \$150 to \$200 per hour; and (4) Service staff will spend an average of 4 to 10 hours at \$100 to \$150 per hour responding to inquiries from each landowner.

#### **4.o. Loss of Conservation Projects**

Some parties have expressed concern that the ongoing activities of the Service to designate critical habitat will cause some landowners to decide not to engage in conservation projects with the Service, NRCS, and/or DLNR. In so doing, they hope to avoid having listed species discovered on their lands, or having their lands identified as favorable habitat for listed species. More to the point, the landowners hope to avoid having their lands designated as critical habitat because they want to protect their existing property rights and property values.

While conservation projects may be lost in other parts of Hawai'i due to critical habitat, the cave animals critical habitat designation may actually increase landowner and developer participation in cave animals conservation projects for two reasons. First, involvement in a conservation projects may make it easier for landowners to obtain approvals for development projects in the critical habitat. Second, a conservation project with a Federal sponsor can be used to obtain an incidental *take* statement (incidental *take* authority based on a no jeopardy biological opinion under section 7 of the Act). Some landowners perceive that incidental take authority through these means can sometimes be done at lower cost and with less time than obtaining an incidental *take* permit through an HCP.

#### **4.p. Island-wide Economic Impacts of Lost Development**

##### **4.p.(1) Introduction**

Estimated loss of development within the proposed critical habitat, as discussed in section 4.c., is also likely to cause an island-wide impact. Table VI-4 summarizes the island-wide estimates of economic impacts that are expected to occur conditioned on the reduction in development summarized in Table VI-3—that is, conditioned on the reduction in hotel, resort/residential, and other development that is projected to occur as a result of the cave animals listing and critical habitat designation.

Only impacts on Kaua'i are estimated, while impacts outside Kaua'i (e.g., tax revenues to the State) are excluded. This reflects the judgment that hotel and resort/residential development displaced from Po'ipu and nearby areas will most likely relocate to Maui or West Hawai'i. As



mentioned in Chapter II, Section 3.b.(4), Po'ipu offers a unique combination of assets for tourism development on Kaua'i. Because development lost to Kaua'i is expected to relocate to other islands, economic growth for the State will not change.

As indicated, the projections cover the period 2003 to 2020, and dollar amounts are in 2002 dollars, with no adjustment for future inflation. Both low and high estimates of economic impacts are provided for listing and critical habitat impacts, where both the listing and the critical habitat designation are assumed.

The economic impacts reflect the economic loss compared to the Baseline Development scenario—not the economic loss compared to current economic activity. The impacts cover the loss of: “direct” expenditures and sales, “indirect” sales generated by the purchase of goods and services by companies and their employees, total sales, profits, direct and indirect employment, payroll, after-tax payroll, taxes paid to the County of Kaua'i, and income benefits (i.e., profits, after-tax payroll to Kaua'i residents, County tax revenues).

Estimates of construction costs and sales prices are based on information provided by landowners and developers, as well as on comparable projects in Po'ipu, Maui, and West Hawai'i. Also, the estimates reflect a weighted average; some developments are likely to realize construction costs and selling prices that will be significantly higher or lower than the amounts shown in Table VI-4.

Economic multipliers are derived from the DBEDT Input-Output Model, which is a complex mathematical model of Hawai'i's economy. However, indirect economic impacts were reduced from the figures derived from the model by 25 percent to reflect the fact that a portion of the economic impacts will occur on O'ahu, since Honolulu is the primary transportation, distribution, service, and government center of the State. Also, construction multipliers were reduced by 20 percent to adjust for the fact that, in many cases, the use of higher-quality and more expensive materials in hotels and resort/residential units does not increase employment related to ordering, delivery, installation, etc. Other economic and population multipliers reflect year 2000 relationships applicable to Kaua'i.

For the growth assumed in Table VI-3, the estimates of resulting economic impacts given in Table VI-4 should be interpreted as accurate within about 20 percent, even though the entries show greater precision. And, given the uncertainty as to the actual impact on development due to the species listing and critical habitat designation (i.e., the uncertainty about the estimates in Table VI-3), the actual economic impacts could be higher or lower than the estimates shown in Table VI-4.

#### **4.p.(2) Decrease in Primary Development: 2020**

Block 1 of Table VI-4 repeats from Table IV-4 the estimated island-wide decrease in primary economic activity that would occur in 2020 because of the listing and the critical habitat designation. The activities covered are those which drive the economy, and include: hotel development,

resort/residential development, and related golf-course development. The decrease in developed acreage is also given.

**4.p.(3) Decrease in Related Development: 2020**

Block 2 of the table gives the decrease in “Related Development” for 2020, including the number of residential homes, commercial space, industrial space, and developed acreage. The estimates reflect the decrease in demand due to less economic and population growth. For these estimates, it is assumed that any demand for homes, commercial space, and industrial space that cannot be supplied by development projects in the proposed critical habitat will be supplied by projects in other areas of Po'ipu, Koloa, and nearby towns.

As indicated, the cave animals listing and critical habitat designation would reduce the demand for residential homes on Kaua'i by about 689 to 1,924 units.

**4.p.(4) Decrease in Resident and Visitor Population: 2020**

Less hotel and resort/residential development will result in fewer residents and visitors on the island. Block 3 of Table VI-4 shows that the cave animals listing and critical habitat designation are estimated to reduce resident and visitor population growth by about 2,928 to 8,149 people.

**4.p.(5) Lost Construction and Related Activity: 2003 to 2020**

Block 4 of the table shows an estimated loss in construction activity of about \$354 million to \$1.029 billion. Averaged over the 18-year period and adding indirect sales on Kaua'i, the loss in construction expenditures and related sales is about \$34.1 to \$99.1 million per year.

Lost construction employment and related employment would average about 263 to 763 jobs. The loss in construction-related payroll would average about \$10 million to \$29 million per year. After-tax payroll is estimated at 87 percent of total payroll.

**4.p.(6) Lost Property Sales: 2003 to 2020**

Over the 18-year period, the loss in property sales is estimated at \$458 million to \$1.235 billion (see Table VI-4, Block 5). These figures do not include resales or the value of custom homes.

**4.p.(7) Lost Economic Activity Related to Hotel and Resort/Residential Operations: 2020**

Block 6 of Table VI-4 shows the loss in economic activity related to hotel and resort/residential operations in the year 2020. The loss in expenditures by visitors, time-share

owners, temporary residents staying in second homes, and retirees staying in resort/residential units, plus related sales on Kaua'i, grow to \$93.3 million to \$258 million per year in 2020.

By the year 2020, lost employment would amount to between 1,069 jobs and 2,957 jobs. The corresponding payroll would be about \$29.3 million to \$80.9 million per year. After-tax payroll is estimated at 87 percent of total payroll.

#### **4.p.(8) Total Employment Loss: 2020**

From Blocks 4 and 6, the estimated employment loss in 2020 from construction and related activity, and from lost hotel and resort/residential operations and related activities, totals about 1,332 to 3,720 jobs.

From Table II-1, employment on Kaua'i is expected to grow from 34,250 jobs in 2000 to about 52,100 jobs in 2020, for an increase of about 17,850 jobs; the corresponding increase for the 2003-to-2020 period is 16,065 jobs. Thus, the cave animals listings and the critical habitat designation reduce projected employment growth by 8.3 to 23.2 percent.

Because of the lower employment growth, many Kaua'i graduates will be forced to leave the island to find employment.

#### **4.p.(9) Lost Tax Revenues to the County of Kaua'i: 2020**

Block 7 of the table shows lost tax revenues to the County of Kaua'i including: property taxes, the county's share of the Transient Accommodations Tax, and miscellaneous taxes. The estimate does not include taxes paid to the State and returned to the county in the form of grants. Subtracting expenditures that will not have to be paid to support residents and visitors provides the estimate of net tax revenues lost to the county.

As indicated in the table, the projected net loss in revenues to the county will grow to between \$1.9 million and \$5.9 million per year by 2020.

#### **4.p.(10) Lost Income Benefits to Kaua'i: 2003 to 2020**

For the 2003-to-2020 period, Block 8 of Table VI-4 summarizes the "income benefits" (i.e., profits, after-tax payroll, County tax revenues) that will be lost to Kaua'i residents as a result of the cave animals listing and critical habitat. As shown in the table, lost income benefits total about \$547 million to \$1.539 billion.

Some of the benefits would fluctuate over time (e.g., construction and property sales), while other benefits would increase steadily. Assuming a real discount rate of 3 percent (i.e., the

municipal bond rate, less inflation), the present value of the lost income benefits is estimated at \$397 million to \$1.117 billion.

For comparison, similar calculations can be performed for projected growth in personal income using the figures near the bottom of Table II-1. As indicated, personal income on Kaua'i is projected to grow from \$1.365 billion in 2000, to \$2.283 billion in 2020, for a 20-year increase of \$918 million. The corresponding 18-year increase from 2003 to 2020 is \$826 million, assuming linear growth ( $\$918 \text{ million} \times 18 \div 20$ ). The after-tax portion is \$719 million (assuming 87% of income). Net taxes paid to the county from all sources are assumed to be zero, since county finances are structured to break even. Cumulative income is \$6.471 billion ( $\$719 \text{ million} \times 18 \div 2$ ), and its present value is \$4.51 billion (3-percent discount rate).

Comparison of this present-value with the figures in Table VI-4 reveals that projected new income benefits for the 2003-to-2020 period will be reduced by 8.8 to 24.8 percent as a result of the listing and critical habitat.

#### **4.p.(11) Potential for Negligible or Extreme Economic Impacts**

It is possible that the economic impacts will be higher or lower than the estimates shown in Table VI-4. For example, it is possible that: the State and county governments will ignore the critical habitat designation and, instead, allow development to proceed without additional conditions; environmental organizations will not file lawsuits to block development based on the listing or the critical habitat designation; developers will be able to devise building techniques that do not expose caves (i.e., inadvertent *takes* do not occur or are not revealed); investors and lenders will not be discouraged by the risks; etc. For this scenario, the cave animals listing and critical habitat designation would have negligible economic impacts beyond those addressed in the previous section on Direct Impacts.

On the other hand, there is a significant risk that the land in the Urban and Agricultural Districts that is designated critical habitat will be redistricted to the Conservation District—either by the LUC or by a mandate from a State court. In these circumstances, the economic impacts will be approximately twice those of the High estimates in Table VI-4.

#### **4.p.(12) Contribution to Economic Impacts by Area**

In general terms, the largest economic losses are associated with land designated in the *General Plan* as Resort and Urban Center (see Figure II-2), and especially land nearer the ocean (Po'ipu) and west of Po'ipu Road (i.e., Kukui'ula). Projects in these areas generally have higher-density development (with the exception of Kukui'ula), higher unit prices, and higher land values. Moving *mauka* (towards the mountains), the economic impacts, densities, unit prices and land values decrease gradually, but they are still substantial.

A few other areas have the potential of generating large economic impacts but, in order for development to proceed, they will require development approval by both the State and the county. The first is a hotel and resort/residential development that is located between, but partially overlaps, Units 1a, 2, and 3. The second is low-density resort/residential development between the Hyatt golf course at Makawehi Bluff and Pu'u Hunihuni. The third is industrial development located adjacent to the Koloa Mill.

## **5. COSTS TO SMALL ENTITIES**

### **5.a. Regulatory Flexibility Act**

Under the Regulatory Flexibility Act (RFA) (as amended by the Small Business Regulatory Enforcement Fairness Act (SBREFA) of 1996), whenever a Federal agency is required to publish a notice of rulemaking for any proposed or final rule, it must prepare and make available for public comment a regulatory flexibility analysis that describes the effect of the rule on small entities (i.e., small businesses, small organizations, and small government jurisdictions). However, no regulatory flexibility analysis is required if the head of an agency certifies that the rule will not have a significant economic impact on a substantial number of small entities.

SBREFA amended the RFA to require Federal agencies to provide a statement of the factual basis for certifying that a rule will not have a significant economic impact on a substantial number of small entities.

While SBREFA does not explicitly define either “substantial number” or “significant economic impact,” the U.S. Small Business Administration (SBA) and other Federal agencies have interpreted “substantial number” to mean 20 percent or more of the small entities in any industry, and “significant economic impact” to equal 3 percent or more of a business’s annual sales.

Federal courts and Congress have indicated that an RFA/SBREFA analysis should be limited to direct and indirect impacts on entities subject to the requirements of the regulation. As such, entities indirectly impacted by the cave animals listing and critical habitat, and, therefore, not directly regulated by the listing or critical habitat designation, are not considered in this screening analysis.

### **5.b. Entities Potentially Impacted**

The analysis is based on a review of all previously discussed projects, activities, land uses and entities that may be impacted by the cave animals listing and critical habitat designation. Based on this review, the following entities will be directly impacted (projects, activities, land uses are noted in parentheses):

**Federal:**

- Service (All projects, activities, land uses)
- FSA (FSA farm loan programs, USDA conservation programs, FSA disaster relief programs)
- NRCS (USDA conservation programs)
- EPA (Permitting mining and quarrying operations, industrial development, wastewater treatment, and injection wells)
- FHWA (Funding construction of new roads)
- ACOE (Permitting construction of new roads, resort/residential development, planned golf courses)
- HUD (Funding loan programs for existing residential homes, funding planned residential development)
- FEMA (Funding natural disaster recovery)

**State:**

- Hawai'i DOT (Construction of new roads)
- HCDC (Residential development)

**County:**

- OCA (Funding loan programs for existing residential homes)
- DPW (Building wastewater treatment plants)

**Private:**

- Grove Farm (Conservation projects, mining and quarrying operations, resort/residential development, planned golf courses, industrial development, injection wells)
- A&B (Construction of new roads)
- Eric A. Knudsen Trust (Injection wells)
- Kobayashi Group, LLC (Planned golf courses, injection wells)
- CIRI Land Development (CIRI) (Injection wells)
- Farmers (Participating in farm loan programs)
- Future Hotel Operator (Resort/residential development)

**5.c. Small Entities Potentially Impacted**

The RFA/SBREFA considers “small entities” to include small governments, small organizations, and small businesses (5 U.S.C. §601). The following discussion examines each

directly regulated entity from the list above to determine whether it would be considered “small” under the RFA/SBREFA.

### **5.c.(1) Federal Agencies**

For the purposes of the RFA/SBREFA, Federal agencies are not considered small governments. As such, the Service, FSA, NRCS, EPA, HUD, FWHA, ACOE, HUD, and FEMA are not considered further in this portion of the economic analysis.

### **5.c.(2) State Agencies**

For the purposes of the RFA/SBREFA, State governments are not considered small government jurisdictions. As such, the Hawai'i DOT and HCDC and other State agencies are not considered further in this portion of the economic analysis.

### **5.c.(3) County Agencies**

The RFA/SBREFA defines "small governmental jurisdiction" as the government of a city, county, town, school district, or special district with a population of less than 50,000. Kaua'i County has a population greater than 50,000 (see Chapter II). As such, county agencies such as the OCA and DPW are not considered "small entities."

### **5.c.(4) Private**

Critical habitat designation will impact several private entities on Kaua'i. In some cases, the private entity directly impacted can be identified. In other cases, many entities or entire industries will be impacted. A determination of whether the private entities impacted are small entities according to SBA definitions is made below.

Grove Farm's primary business activity is real estate asset management. The SBA defines a business in the real estate asset management industry as small if its annual sales are less than \$1.5 million. According to this definitions and 2000 sales information, Grove Farm is not a small business (Dun & Bradstreet, 2002).

A&B's primary business activities are food products, real estate, and ocean transport. The SBA defines a business in the food products industry as small if its annual sales are less than \$750,000; it defines a business in the real estate industry as small if its annual sales are less than \$6 million; and it defines a business in the ocean transport industry as small if its annual sales are less than \$18.5 million. According to these definitions and the financial statements included in A&B's 2001 Annual Report, A&B is not a small business. A&B's revenues in 2001 totaled \$1.19 billion, of which about \$106 million was from food products; about \$159 million was from real estate; about

\$787 million was from ocean transportation; and about \$138 million was from interest, dividends, and the sale of investments.

Eric A. Knudsen Trust (Knudsen Trust) is primarily a real estate investment trust. The SBA defines a real estate investment trust as small if its annual sales are less than \$6 million. However, Knudsen Trust is a private entity and its annual revenue figures are not public. Representatives of the Knudsen trust have verified that the trust is a small entity.

Kobayashi Group, LLC's (Kobayashi) primary business activity is real estate asset management. The SBA defines a business in the real estate asset-management industry as small if its annual sales are less than \$1.5 million. Kobayashi is a private business, and its annual sales figures are not listed in the Dun and Bradstreet database. However, the Kobayashi Group owns the following properties; two hotels in Waikiki, the Ocean Resort Hotel Waikiki (450) rooms and the Queen Kapiolani Hotel (314 rooms); three golf courses; developable land in Koloa; and possibly other property. Rough estimates of the revenues generated from these properties suggest that annual revenues for the Kobayashi Group are at least \$24 million  $[(764 \text{ rooms} \times 70\% \text{ occupancy} \times \$100 \text{ per room} \times 365 \text{ days}) + (3 \text{ golf courses} \times 30,000 \text{ rounds of golf per year} \times \$50 \text{ per round}) = \$24 \text{ million per year}]$ . Therefore, Kobayashi is not a small business.

CIRI Land Development is a subsidiary of CIRI, an Alaska Native Regional corporation. CIRI's diversified business interests include telecommunications, construction services and oil-field support, natural resources, real estate, and tourism. In 2001, CIRI's gross revenues were \$842 million, which is greater than the SBA definition for a small business in any of CIRI's business interests, so it is not a small business.

Two to three farmers may be impacted by the cave animals listing and critical habitat designation. These farmers are likely to be the fruit (excluding pineapple) or vegetable farmers. The SBA defines fruit or vegetable farms as small if their annual sales are less than \$0.75 million. In 1999, there were 188 fruit (excluding pineapple) and vegetable farms on Kaua'i and the total sales for these farms was roughly \$4 million (DBEDT, 2000). Thus, the average sales for each fruit and vegetable farmer was \$21,300  $(\$4 \text{ million} \div 188)$ .

Based on the total sales, no more than five of the fruit and vegetable farms in Kaua'i could make more than \$0.75 million in annual sales. If six farms had sales of \$0.75 million or greater per year, their combined sales would be \$4.5 million  $(6 \times \$0.75 \text{ million})$ , which is greater than the total annual sales for all of the fruit and vegetable farms on Kaua'i (\$4 million). Thus, at least 183  $(188 - 5)$  of the fruit and vegetable farms on Kaua'i are small businesses according to SBA definitions. Based on this information, it is reasonable to assume that the two to three farmers are small businesses.

The future hotel operator in the planned development along the Maha'u lepu shoreline will be in the hotel industry. The SBA defines a business in the hotel industry as small if its annual sales



are less than \$6 million. According to the revenue assumptions for hotel rooms presented in Table VI-4 and other potential revenues from golf course operations, restaurants, shops, activities, etc., this future hotel operator will not be a small business.

#### **5.d. Potential Impacts on Small Entities**

The small or potentially small entities that may be impacted by the cave animals listing and critical habitat designation are two to three fruit and vegetable farmers and Knudsen Trust.

##### **5.d.(1) Fruit and Vegetable Farming Industry**

The direct economic cost per farmer will be \$1,400 for the costs associated with participation in a Low-cost section 7 consultation for a non-Federal applicant (Table VI-1), and \$6,300 for the cost of a biological survey of a medium-sized parcel of land. The farmers may face additional costs associated with project modifications. Thus, the total economic impact per farmer would be at least \$7,700 (\$1,400 + \$6,300).

As mentioned above, the average sales per fruit and vegetable farmer on Kaua'i amounts to \$21,300. Since \$7,700 is 36 percent of the average annual sales for a farmer, it is assumed that critical habitat will have a significant economic impact (i.e., 3 percent or more of a business's annual sales) on these two to three farmers.

However, only two to three farmers out of 183 small fruit and vegetable farmers on Kaua'i (1.1 to 1.6 percent) will be subject to the significant economic impact. This does not equal a substantial number (i.e., 20 percent) of the small entities in this industry.

##### **5.d.(2) Real Estate Investment Trusts**

The direct economic costs to the Knudsen Trust will be \$1,400 for the costs associated with participating in a Low-cost section 7 consultation for a non-Federal applicant (Table VI-1), and \$2,000 for a biological survey of a small-sized parcel of land. The Knudsen Trust will also face \$20,000 to \$25,000 in project modification costs associated with the installation of an injection well. Thus, the total economic impact to the Knudsen Trust will be \$23,400 to \$28,400.

The average annual revenue for the Knudsen Trust is unknown. If the Trust earns less than \$946,666 in annual revenues (\$28,400 divided by 3 percent), the economic impact of critical habitat would be significant to the Knudsen Trust (i.e., greater than 3 percent of annual sales).

In 2000, roughly 3,800 trusts owned land on Kaua'i, and most of them are small landowners. Only one trust out of roughly 3,800 small real estate investment trusts on Kaua'i (0.02 percent) will

potentially be subject to a significant economic impact. This does not equal a substantial number (i.e., 20 percent) of the small real estate investment trusts.

### **5.d.(3) Summary**

Based on the discussion above, this analysis concludes that the designation of critical habitat for the cave species is not likely to significantly impact a substantial number of small entities. Two to three small fruit and vegetable farmers and one small real estate investment trust may be significantly impacted by the proposed rule. However, these entities do not represent a substantial number of the total small entities in these industries.

## **6. BENEFITS**

### **6.a. Introduction**

There is little disagreement in the published economics literature that real social welfare benefits can result from the conservation and recovery of endangered and threatened species (Bishop (1978, 1980), Brookshire and Eubanks (1983), Boyle and Bishop (1986), Hageman (1985), Samples *et al.* (1986), Stoll and Johnson (1984)). Such benefits have also been ascribed to preservation of open space and biodiversity (see examples in Pearce and Moran (1994) and Fausold and Lilieholm (1999)) both of which are associated with species conservation. Likewise, a regional economy can benefit from the preservation of healthy populations of endangered and threatened species, and the habitat on which these species depend.

It is not feasible, however, to fully describe and accurately quantify these benefits in the specific context of this economic analysis. For example, most of the studies in the economics literature do not allow for the separation of the benefits of listing (including the Act's *take* provisions) from the benefits of critical habitat designation. The discussion presented in this section provides examples of potential benefits, which derive primarily from the listing of the species, based on information obtained in the course of developing the economic analysis. It is not intended to provide a complete analysis of the benefits that could result from section 7 of the Act in general, or of critical habitat designation in particular. In short, the Service believes that the benefits of critical habitat designation are best expressed in biological terms that can be weighed against the expected cost impacts of the rulemaking.

### **6.b. Benefits of Species Preservation**

The primary purpose of critical habitat designation is to protect areas that are needed to preserve threatened and endangered species. Critical habitat designation can also help educate unaware landowners or land managers about the importance of protecting the habitat of the listed species on their land.

If these endeavors are successful, the environmental benefits anticipated by Service staff and other biologists include: the survival and recovery of the cave animals, greater biodiversity and healthier cave ecosystems, and enhanced opportunities for scientific experts to study the cave animals. In addition, a number of people derive satisfaction simply from knowing that endangered and threatened species are being saved and that the species will be on earth for future generations to appreciate—even if they may never personally view them.

However, no known scientific studies have focused on the probability of successfully recovering the cave animals, or the extent to which they can be recovered. Also, no known economic studies have focused on the value of preserving the cave animals. And, given the scope of this economic analysis, no primary scientific and economic research was conducted on the value of preserving the cave animals.

Most research on the value of species preservation has focused on mammals (e.g., the grizzly bear, gray wolf, humpback and gray whales, sea turtle, sea otter, bighorn sheep, etc.); birds (e.g., bald eagle, spotted owl, whooping crane, red-cockaded woodpecker, etc.); and fish (e.g., Pacific and Atlantic salmon, steelhead, cutthroat trout, squawfish, striped shiner, etc.). Depending upon the species, studies indicate that households are willing to pay an average amount ranging from \$6 per year for the striped shiner to \$70 per year for the spotted owl, or they are willing to pay lump-sum amounts of \$15 for the cutthroat trout to \$216 for the bald eagle (Loomis and White). None of these studies is reasonably transferable to the cave animals.

Household willingness-to-pay to preserve the cave animals is likely to be substantially lower than the above amounts, particularly since the cave animals are not well-known to the general public.

Thus, the economic value of the preservation benefits is not estimated due to (1) a lack of scientific studies on the net changes in the population of cave animals that would be attributable to the cave animals listing and the critical habitat designation, and (2) the lack of existing economic studies on the economic value of these changes.

#### **6.c. Reduced Costs Due to Successful Preservation**

If the proposed critical habitat designation culminates in the successful recovery of the cave animals, then related benefits would be: (1) reduced internal costs to the Service and to the other federal agencies that are involved in consultations on the cave animals; (2) reduced internal costs for non-federal Applicants; (3) reduced costs for biological surveys (for cost estimates, see Section 3 above); and (4) reduced costs for project modifications designed to avoid adverse impacts. For the cave animals, the reduction in these costs could be large, given the likelihood of numerous consultations in the developing Koloa area, and given the impact of the species listing and critical habitat designation on proposed development.

**6.d. Environmental Benefits and Other Benefits**

If the proposed critical habitat designation results in less resort development and other development and less farming, or modified development and modified farming, this could result in environmental benefits and other benefits as discussed below. For the most part, however, scientific studies and other studies have not been done to estimate the magnitude of the environmental changes and other changes resulting from the listing and the critical habitat designation for the cave animals. Nor have studies been done on the economic value of such changes.

**(1) Maha'ulepu Coast**

The Maha'ulepu coast is an attractive, undeveloped coastal area that is easily accessible to Koloa residents, even though the land and access roads are privately owned. No similar areas with good access exist in the Koloa District. Based on discussions with the County Planning Department, the community places a high value on preserving this area for shoreline recreational use, as well as for subsistence fishing and gathering. However, residents' willingness to pay to preserve this coastal area has not been measured.

Although resort development is planned for a portion of Maha'ulepu, current plans indicate that most of the coastal area will remain undeveloped. Also, future development will depend upon State and county approvals which, in turn, will depend on community support for such development.

Even though much of the proposed resort development is outside the proposed critical habitat between Units 1a and 2, critical habitat designation would bolster the argument that the Maha'ulepu coastal area should be preserved.

**(2) Open Space**

By reducing the amount of resort and residential development in Po'ipu and Koloa, critical habitat designation would contribute to open space. This could enhance the environmental quality of the area if the natural vegetation is attractive or if the undeveloped land is landscaped. But some areas could become overgrown with *kiawe* and other large unattractive weeds as is currently the case in some areas of the Koloa District.

**(3) Soil Runoff and Chemical Runoff**

Reductions in and modifications to development, landscaping, and farming due to the critical habitat designation could decrease soil and chemical runoff that

degrades the marine environment. Such chemicals could include fertilizers, pesticides, herbicides, etc.

However, soil and chemical runoff from development, landscaping and farming is likely to occur at a far lower volume than occurred during the 150+ years that sugarcane was commercially cultivated throughout Koloa. Also, Koloa has an open coastline that is exposed to surf and strong ocean currents that continuously flush the near-shore environment. This contrasts with embayments, which are poorly flushed by currents.

Nevertheless, Koloa Landing is proposed for listing as “Impaired,” but at a low priority (Henderson and Harrigan). The basis for the proposed listing, however, is not due to soil and chemical runoff: it is due to *enterococi* pollutant from Waikomo Stream.

Also, any farming displaced from Koloa is likely to relocate to former sugarcane lands near Lihue. Runoff from these farm lands drains into Nawiliwili Stream and Nawiliwili Bay, and Hanama'ulu Stream and Hanama'ulu Bay. The Environmental Planning Office of the State Department of Health proposes to list Nawiliwili Stream as “Impaired” as a high priority due to turbidity. The Environmental Planning Office also proposes to list Hanama'ulu Stream and Hanama'ulu Bay as “Impaired” as high and low priorities, respectively. Again, the priorities are due to turbidity.

Thus, environmental benefits of reduced runoff in Koloa may be relatively small and, if farms are relocated to areas outside the critical habitat, could be more than offset by increased runoff problems elsewhere on the island.

#### **(4) Traffic Congestion**

Less resort and residential development due to critical habitat designation would result in fewer visitors and residents, and less traffic. Assuming limited road construction, less traffic could result in less congestion and less time spent commuting. Based on the average salary of Kaua'i residents, most commuters probably value their time lost to commuting at about \$5 to \$10 per hour (a little less than their average take-home pay).

However, much of the residential development that may be displaced because of critical habitat is likely to locate in nearby towns (i.e., increased urban sprawl). As a result, residents who work in Po'ipu and Koloa Town but are forced to live outside the area would have a longer commute, and would contribute to increased traffic congestion on the main roads into the Koloa District.

Traffic studies have not been performed to determine the net affect on traffic congestion.

**(5) Native Plants**

Project modifications recommending the planting and irrigation of native plants above caves and mesocaverns in the critical habitat will help to preserve and conserve these plants.

**6.e. Ecotourism**

As mentioned in Section 2, commercial hiking tours, led by professional naturalist guides and featuring Hawai'i's ecosystems and endemic species are offered along the Maha'ulepu coast and elsewhere on Kaua'i. Conceivably, critical habitat designation for the cave animals could benefit these ecotourism operations by providing a marketing dimension that would further enhance their appeal to visitors. However, this benefit is expected to be slight inasmuch as viewing the cave animals would be very difficult, given that they spend most of their time in the small recesses of caves that are inaccessible to humans. Also, entrances to caves are blocked to protect the cave animals from human intrusion. The Service discourages human visitation to the caves.

In a broader sense, however, less development of the Maha'ulepu coastal area would offer opportunities for enhanced visitor experiences that would attract more visitors to this area. However, the loss of resort development due to critical habitat designation is likely to result in a net loss of visitors to the island. Also, other areas on Kaua'i are being proposed for ecotourism.

**6.f. Economic Activity Generated by Conservation Management**

In FY 2001, the Service spent an estimated \$340,000 on conservation management for listed plants in Kaua'i County, including expenditures on salaries, equipment, supplies and services. In turn, workers and companies that benefitted from the Services's expenditures on conservation management purchased additional goods and services, thereby generating additional economic activity. In total, the initial Service expenditure generated approximately \$600,000 in direct and indirect sales for the year on Kaua'i and other islands, and supported about seven direct and indirect jobs in Hawai'i (based on multipliers from the Hawai'i Input-Output Model, DBEDT, 1998). The State and other organizations also spend considerable sums on conservation management that involve listed plants in Kaua'i County (e.g., State expenditures to manage Natural Area Reserves—Chapter IV).

If the proposed critical habitat results in an increase in conservation management efforts in Kaua'i County, then the increase in expenditures could contribute to an increase in economic activity in Hawai'i. Based on State multipliers, each additional \$1 million of new money spent in Hawai'i

would generate approximately \$1.76 million in direct and indirect sales in Hawai'i, and would support approximately 21.5 direct and indirect jobs in Hawai'i.

As mentioned in the section on Indirect Costs, if the entire proposed critical habitat were managed to support critical habitat (which is not expected unless mandated by court order), the total cost would be \$81.1 million to \$128 million. This expenditure would generate about \$143 million to \$225 million in direct and indirect sales in Hawai'i, and would support about 170 to 280 direct and indirect jobs, assuming the cost is spread out over a 10-year period.

However, the economic activity supported by expenditures on conservation management may or may not represent an expansion of Hawai'i's economy, depending upon how the expenditures are financed.

If the increase in conservation management is financed by an influx of new money from outside Hawai'i, then the increase in expenditures will contribute to increased economic activity in Hawai'i. New funding for conservation management could come from the federal government, grants from non-profit organizations outside Hawai'i, etc. While this is possible, no known projections are available that indicate a significant increase in funding for conservation management from outside Hawai'i as a result of the proposed critical habitat designation.

At the national level, however, increased funding of conservation programs in Hawai'i would result in no significant change in economic activity for the economy as a whole because any funds spent in Hawai'i would be at the expense of expenditures elsewhere in the economy (e.g., the funds would be diverted from some other federal program). In effect, the increase in economic activity in Hawai'i would represent a transfer of economic activity from elsewhere in the national economy.

The same situation applies to Hawai'i's economy. If increased expenditures on conservation management are funded from within Hawai'i, these funds would be diverted from some other expenditure within in Hawai'i. If the funds come from outside Hawai'i for some expenditure that would otherwise still be made in Hawai'i, this would also be diverted from elsewhere in Hawai'i. In this situation, there would be no significant change in economic activity for Hawai'i's economy as a whole, since any funds spent in Hawai'i would be spent at the expense of funds spent elsewhere in Hawai'i's economy. In effect, the increase in economic activity from increased expenditures on conservation management would represent a transfer of economic activity from elsewhere in Hawai'i's economy.

#### **6.g. Benefits to Developers**

For areas that are known to be *occupied* by listed species, the main advantage to developers of critical habitat designation is to provide them with more information about where to site their projects. By knowing the critical habitat boundaries, they can site projects outside *occupied* areas, thereby avoiding certain issues related to threatened and endangered species.

Even if there is no flexibility in siting a project, it can still be helpful to developers to know the location of *occupied* areas. If a project is located outside the critical habitat boundaries, then the developer can proceed with project planning with less risk of facing issues related to listed species. On the other hand, if a project is located inside critical habitat boundaries and there is *federal involvement*, then the developer should know that informal consultations with the Service must take place before proceeding with detailed site plans.

## **7. SUMMARY OF ECONOMIC IMPACTS**

For various economic activities in the proposed critical habitat, Table VI-5 presents quantitative and qualitative estimates of: the following: (1) direct costs attributable to the section 7 provisions of the Act; (2) indirect costs; and (3) benefits. The two columns give the low and high estimates for the costs and benefits that are associated with listing the cave animals as endangered species *and* with designating critical habitat for the cave animals.

### **7.a. Direct Costs**

Over the 18-year period from 2003 to 2020, the direct costs for section 7 consultations and project modifications could exceed from \$56.5 million to \$62.3 million.

Many of the costs would be for the following: (1) infrastructure projects (roads, wastewater treatment, injections wells, etc.); and (2) private developments that are located near a natural stream or drainage. The infrastructure projects are spread throughout the area. However, the direct impacts to private developments are centered around the Waikomo Stream and what was once a natural drainage near the existing Maha'ulepu quarry.

The highest direct cost is associated with hotel and resort/residential development on a section of the Maha'ulepu coast (westernmost portion of Unit 1a; portions of Units 2 and 3). Also, the cost includes both the direct cost to the hotel operator in the form of lost revenues as well as the island-wide "ripple" effects of a decline in the tourism and construction industries. It should be noted, however, that this project has not been approved for development.

The next highest direct cost would be for a section 7 consultation and project modification on a planned limestone quarry (southern portion of Unit 3). Also, this direct cost includes both the direct cost to the landowner and to the quarry operator in the form of lost revenues, as well as the higher island-wide cost of limestone due to losing a local source.

### **7.b. Indirect Costs**

The indirect impacts are significantly higher than the direct impacts. These impacts stem primarily from the lost economic and population growth associated with hotel and resort/residential



development. By the year 2020, expenditures and sales would be reduced island-wide by about \$98 million per year to \$270.9 million per year.

For the entire 2003-to-2020 period, the total loss in income benefits could range from \$546.7 million to \$1.5 billion attributable to the listing and critical habitat. Also, the loss in property value could range from \$36 million to \$72 million. Due to various uncertainties, it is possible that these economic impacts could be significantly higher or lower.

In general terms, the largest economic losses are associated with land designated in the year 2000 *Kaua'i County General Plan (General Plan)* as a Resort and Urban Center, and especially land nearer the ocean (Po'ipu) and west of Po'ipu Road (i.e., Kukui'ula). Projects in these areas generally have higher-density development (with the exception of Kukui'ula), higher unit prices, and higher land values. Moving *mauka* (towards the mountains), the economic impacts, densities, unit prices and land values decrease gradually, but they are still substantial.

A few other areas have the potential of generating large economic impacts but, in order for development to proceed, they will require development approval by both the State and the county. The first is a hotel and resort/residential development that is located between, but partially overlapping, Units 1a, 2 and 3. The second is low-density resort/residential development between the Hyatt golf course at Makawehi Bluff and Pu'u Hunihuni. The third is industrial development adjacent to the old Koloa Sugar Mill.

Given the small size of the Kaua'i economy, these economic impacts reflect a major loss in planned economic and population growth for the island, and reflect a major deviation from the county *General Plan*.

Additional quantifiable indirect impacts include increased environmental review for successful development projects; the preparation costs of HCPs; the effort required to contest potential redistricting; the preparation of EISs as part of State and county review; and the costs to investigate the implications of critical habitat. Although not subject to accurate quantification, other indirect costs could add substantially to the indirect costs. These impacts include the undetermined probability of additional litigation; impacts to individual residential, commercial, and industrial landowners and developers; possible losses in agricultural production; and the possibility of court-ordered land management for the cave animals.

### **7.c. Benefits**

Economic benefits occurring as a result of designating the proposed critical habitat, and the related actions taken to enhance the cave animals habitat (e.g., landscaping with native vegetation) include: (1) the benefits associated with preserving the cave animals; (2) potential reduced costs to the Service and other entities if the preservation efforts are successful; (3) potential contribution to preserving undeveloped open space along the Maha'ulepu coast and other areas in Koloa; (4)

possible reduction in soil and chemical runoff into the marine environment off Koloa because of less farming and development; (5) less traffic congestion because of less island-wide economic and population growth; (6) ecotourism benefits if the Maha'ulepu coast remains undeveloped; (7) possibly an influx of new funds from outside the State for conservation management that would contribute to expanded economic activity; and (8) better siting of projects by developers so as to avoid costly project delays and project modifications due to development that might be placed inadvertently near areas *occupied* by listed species.

Table VI-2. New Road Construction Project Modification Costs

CH = critical habitat, n/a = not applicable

Item	Poipu-Kipu Connector	Koloa Bypass Widening	Poipu Road Widening	West Koloa Bypass	Total
<b>Characteristics</b>					
Length in CH (miles)	2.0	2.5	0.5	0.8	5.8
Linear feet	10,560	13,200	2,640	4,224	30,624
Average Right-of-Way Width (feet)	100	100	100	100	n/a
Area impacted (acres)	24.2	30.3	6.1	9.7	70.3
Landscaped Area (acres)	14.5	39.4	7.9	5.8	67.6
<b>Survey Costs</b>					
Geological (\$3,000 per acre impacted)	\$ 72,600	\$ 90,900	\$ 18,300	\$ 29,100	\$ 210,900
<b>Road Construction Cost</b>					
Percentage PT-Slabs					
Low (explained in text)	10%	15%	25%	50%	n/a
High (explained in text)	15%	25%	50%	75%	n/a
Additional Construction Cost					
Low (\$800 per linear foot)	\$ 633,600	\$ 1,188,000	\$ 396,000	\$ 1,267,200	\$ 3,484,800
High (\$800 per linear foot)	\$ 950,400	\$ 1,980,000	\$ 792,000	\$ 1,900,800	\$ 5,623,200
<b>Conservation Measures</b>					
Landscaping					
Low (\$3,200 per acre landscaped)	\$ 46,400	\$ 126,100	\$ 25,300	\$ 18,600	\$ 216,400
High (\$6,600 per acre landscaped)	\$ 95,700	\$ 260,000	\$ 52,100	\$ 38,300	\$ 446,100
Conserving Caves					
Low (\$570 per acre impacted)	\$ 13,800	\$ 17,300	\$ 3,500	\$ 5,500	\$ 40,100
High (\$1,650 per acre impacted)	\$ 39,900	\$ 50,000	\$ 10,100	\$ 16,000	\$ 116,000
<b>Total Project Modification Cost</b>					
Low	\$ 766,400	\$ 1,422,300	\$ 443,100	\$ 1,320,400	\$ 3,952,200
High	\$ 1,158,600	\$ 2,380,900	\$ 872,500	\$ 1,984,200	\$ 6,396,200
Sources: Geolabs, Inc.; Wilson Okamoto & Associates, Inc.; Hawaii Department of Transportation; Construction Consultants, Inc.; United States Geological Survey, Soil Conservation Service.					

**Table VI-3. Projected 2020 Development, With and Without  
Cave-Animal Listing and Critical Habitat Designation**

CH = critical habitat

Type of Development	Low Projection				High Projection			
	Baseline Develop- ment	Listing and CH			Baseline Develop- ment	With Listing and CH		
		Develop- ment	Change			Develop- ment	Change	
			CH Area	Island*			CH Area	Island*
Hotel Rooms	-	-	-	-	194	97	(97)	(97)
Resort/Residential Units								
Oceanfront Multi-family	569	427	(142)	(142)	819	410	(410)	(410)
Other Multi-family	500	375	(125)	(125)	545	272	(272)	(272)
Single Family	400	300	(100)	(100)	538	269	(269)	(269)
Lots for Custom Homes	300	225	(75)	(75)	350	175	(175)	(175)
Total Resort/Residential Units	1,769	1,327	(442)	(442)	2,253	1,126	(1,126)	(1,126)
18-hole Golf Courses	0.5	0.5	-	-	2.5	1.0	(1.5)	(1.5)
Clubhouses	-	-	-	-	2.0	1.0	(1.0)	(1.0)
Developed Acreage	399	299	(100)	(100)	715	358	(358)	(358)
Golf Course Acreage	90	90	-	-	450	180	(270)	(270)
Residential Homes	642	482	(161)	(689)	642	321	(321)	(1,924)
Commercial								
Land Area (acres)	3.6	2.7	(0.9)	(16.8)	18.6	9.3	(9.3)	(46.8)
Floor Area (sq. ft., at 20% coverage)	30,928	23,196	(7,732)	(146,385)	161,608	80,804	(80,804)	(407,434)
Industrial								
Land Area (acres)	-	-	-	(13.4)	23.5	11.8	(11.8)	(37.4)
Floor Area (sq. ft., at 20% coverage)	-	-	-	(117,108)	204,732	102,366	(102,366)	(325,947)

\*The island-wide decrease reflects (1) the fact that some development may relocate to areas outside of the proposed critical habitat, and (2) the changes in demand due to less economic and population growth.

**Table VI-4. Island-wide Economic and Demographic Impacts of  
Cave Animal Listing and Critical Habitat Designation: 2003 to 2020**  
(in year 2002 dollars)

CH = critical habitat \* = Lost Income Benefits

Type of Impact	Low Estimate	High Estimate
	Listing and CH Impacts	Listing and CH Impacts
<b>1 Decrease in Primary Development: 2020</b>		
Decrease in Hotel Rooms	-	97
Decrease in Resort/Residential (R/R) Units		
Oceanfront Multi-family Units	142	410
Other Multifamily Units	125	272
Single-family Homes	100	269
Lots for Custom Homes	75	175
Total Units	442	1,126
Decrease in Golf Courses	-	1.5
Decrease in Clubhouses	-	1.0
Decrease in Developed Acreage	100	628
<b>2 Decrease in Related Development: 2020</b>		
Residential Homes (2.9 people/home)	689	1,924
Commercial Space (50 sq. ft./resident and visitor)	146,385	407,434
Industrial Space (40 sq. ft./resident and visitor)	117,108	325,947
Decrease in Developed Acreage (4 homes/acre and		
Residential (4 homes/acre)	172	481
Commercial (floor area at 20% of land area)	17	47
Industrial (floor area at 20% of land area)	13	37
Total	203	565
<b>3 Decrease in Resident and Visitor Population: 2020</b>		
Average Census, Hotel and R/R Units (70% occupied, 3 people/unit)	929	2,568
Residents (1.5 people /job)	1,999	5,580
Total Resident and Visitor Population	2,928	8,149
<b>4 Lost Construction and Related Economic Activity: 2003 to 2020</b>		
Expenditures and Sales		
Direct Construction Expenditures		
Hotels (\$400,000 per unit)	\$ -	\$ 38,709,677
Resort/Residential Units		
Oceanfront Multi-family (\$450,000/unit)	\$ 64,062,062	\$ 184,374,124
Other Multi-family (\$300,000/unit)	\$ 37,500,000	\$ 81,712,329
Single-family (\$500,000)	\$ 50,000,000	\$ 134,587,215
Custom (\$700,000)	\$ 52,500,000	\$ 122,500,000
Golf Courses (\$25 million/course)	\$ -	\$ 37,500,000
Clubhouses (\$10 million)	\$ -	\$ 10,000,000
Single-family Residential Homes (\$150,000/home)	\$ 103,383,777	\$ 288,635,598
Commercial Space (\$200/square foot)	\$ 29,277,093	\$ 81,486,792
Industrial Space (\$150/square foot)	\$ 17,566,256	\$ 48,892,075
Total	\$ 354,289,188	\$ 1,028,397,810
Annual	\$ 19,682,733	\$ 57,133,212
Indirect Sales, Annual (98% x 75%)	\$ 14,466,809	\$ 41,992,911
Total Direct and Indirect Sales, Annual	\$ 34,149,541	\$ 99,126,122

**Table VI-4. Island-wide Economic and Demographic Impacts of  
Cave Animal Listing and Critical Habitat Designation: 2003 to 2020**

(in year 2002 dollars)

(continued)

CH = critical habitat      \* = Lost Income Benefits

Type of Impact	Low Estimate	High Estimate
	Listing and CH Impacts	Listing and CH Impacts
Lost Profit, Annual (5% of Sales) *	\$ 1,707,477	\$ 4,956,306
Lost Employment, Annual		
Construction Jobs (8.7 jobs/\$1 million direct, discounted 20%)	137	398
Indirect Jobs (8 jobs/\$1 million direct, discounted 20%)	126	366
Total Jobs	263	763
Lost Payroll, Annual		
Construction Payroll (\$47,830/job)	\$ 6,552,319	\$ 19,019,463
Indirect Payroll (\$27,230/job)	\$ 3,430,149	\$ 9,956,719
Total Payroll	\$ 9,982,468	\$ 28,976,182
After-Tax Payroll (87%) *	\$ 8,684,747	\$ 25,209,279
<b>5 Lost Property Sales: 2003 to 2020</b>		
Resort/Residential Units		
Oceanfront Multi-family Units (\$900,000/unit)	\$ 128,124,124	\$ 368,748,248
Other Multi-family Units (\$400,000/unit)	\$ 50,000,000	\$ 108,949,772
Single-family Units (\$700,000/unit)	\$ 70,000,000	\$ 188,422,100
Single-family Lots (\$500,000/lot)	\$ 37,500,000	\$ 87,500,000
Single-family Residential Homes (\$250,000/home)	\$ 172,306,295	\$ 481,059,329
Total	\$ 457,930,419	\$ 1,234,679,449
Annual	\$ 25,440,579	\$ 68,593,303
Lost Profits/Commissions, Annual (10%) *	\$ 2,544,058	\$ 6,859,330
<b>6 Lost Economic Activity Related to Hotel and R/R Operations: 2020</b>		
Number of Visitor Units		
Hotel Rooms	-	97
Multi-family Units in Rental Pool (50%)	134	341
Total	134	438
Visitor Expenditures and Sales		
Direct Expenditures		
Room Revenues (70% occupancy, \$215/room per day)	\$ 7,343,380	\$ 24,050,632
Other Expenditures (residual)	\$ 57,079,738	\$ 154,067,283
Total (\$190/person per day in R/R units)	\$ 64,423,119	\$ 178,117,915
Indirect Sales, 2020 (59.8% x 75%)	\$ 28,893,769	\$ 79,885,885
Total Direct and Indirect Sales	\$ 93,316,887	\$ 258,003,800
Lost Profit (5%) *	\$ 4,665,844	\$ 12,900,190
Lost Employment		
Direct Jobs (10.8 jobs/\$1 million direct)	696	1,924
Indirect Jobs (5.8 jobs/\$1 million direct)	374	1,033
Total Jobs	1,069	2,957
Lost Payroll		
Direct Payroll (\$27,440/job)	\$ 19,091,920	\$ 52,785,600
Indirect Payroll (27,230/job)	\$ 10,174,601	\$ 28,130,875
Total Payroll	\$ 29,266,521	\$ 80,916,475
After-Tax Payroll (87%) *	\$ 25,461,873	\$ 70,397,333

**Table VI-4. Island-wide Economic and Demographic Impacts of  
Cave Animal Listing and Critical Habitat Designation: 2003 to 2020**  
(in year 2002 dollars)  
(continued)

CH = critical habitat \* = Lost Income Benefits

Type of Impact	Low Estimate	High Estimate
	Listing and CH Impacts	Listing and CH Impacts
<b>7 Lost Tax Revenues to the County of Kaua'i: 2020</b>		
Lost Assessed Value		
Single-family Residential Homes		
Total Value	\$ 172,306,295	\$ 481,059,329
Less Owner-Occupied Exemption (60% of homes x \$40,000)	\$ (16,541,404)	\$ (46,181,696)
Net Single-family Residential	\$ 155,764,891	\$ 434,877,634
Other Property		
Hotel (\$700,000/room)	\$ -	\$ 67,741,935
Resort/Residential Units		
Oceanfront Multi-family Units	\$ 128,124,124	\$ 368,748,248
Other Multi-family Units	\$ 50,000,000	\$ 108,949,772
Single-family Homes	\$ 70,000,000	\$ 188,422,100
Custom Homes (lot and home value)	\$ 90,000,000	\$ 210,000,000
Commercial Space (improvements and land at \$500,000/acre)	\$ 37,678,463	\$ 104,870,284
Industrial Space (improvements and land at \$300,000/acre)	\$ 21,598,913	\$ 60,116,151
Golf Courses (\$18 million/course)	\$ -	\$ 27,000,000
Clubhouses	\$ -	\$ 10,000,000
Total, Other Property	\$ 397,401,500	\$ 1,145,848,491
Less Value of Land Left Undeveloped (\$1,000/acre)	\$ (302,364)	\$ (1,192,765)
Total Assessed Value	\$ 552,864,027	\$ 1,579,533,359
Lost Property Taxes		
Single-family Residential Homes (\$5/\$1000)	\$ 778,824	\$ 2,174,388
Other Property (\$8.50/\$1000)	\$ 3,377,913	\$ 9,739,712
Less Property Taxes on Land Left Undeveloped (\$8.10/\$1,000)	\$ (2,449)	\$ (9,661)
Total Lost Property Taxes, 2020 *	\$ 4,154,288	\$ 11,904,439
Lost Transient Accommodations Taxes, 2020 (7.25% of room revenues x 50%)	\$ 266,198	\$ 871,835
Lost Misc. Taxes (\$109/resident and visitor)	\$ 319,120	\$ 888,206
Lost County Tax Revenues, 2020	\$ 4,739,606	\$ 13,664,480
Less Support Expenditures (\$957/resident and visitor)	\$ (2,801,818)	\$ (7,798,286)
Net County Tax Revenues, 2020 *	\$ 1,937,788	\$ 5,866,194
<b>8 Lost Income Benefits to Kaua'i: 2003 to 2020</b>		
Income Benefits		
Construction Activity (direct and indirect)		
Profits (annual amount x 18 yrs)	\$ 30,734,587	\$ 89,213,510
After-Tax Payroll (annual amount x 18 yrs)	\$ 156,325,447	\$ 453,767,016
Property Sales, After-Tax Profits/Commissions (annual amount x 18 yrs)	\$ 45,793,042	\$ 123,467,945
Hotel and Resort/Residential Operations (direct and indirect)		
Profits (2020 amount x 18 yrs/2)	\$ 41,992,599	\$ 116,101,710
After-Tax Payroll (2020 amount x 18 yrs/2)	\$ 229,156,858	\$ 633,576,000
County Tax Revenues (2020 amount x 18 yrs/2)	\$ 42,656,453	\$ 122,980,323
TOTAL	\$ 546,658,988	\$ 1,539,106,505
Present Value of Income Benefits (3% discount rate)	\$ 396,622,470	\$ 1,117,409,281
Percentage Loss of New Island-wide Income Benefits with No Listing and No Critical Habitat	8.8%	24.8%

**Table VI-5. Section 7 Costs and Benefits Attributable to the  
Cave Animals Listing and Critical Habitat**  
(18-year estimates)

CH = critical habitat PMs = project modifications O&M = operation and maintenance Fed = Federal ne = not estimated

Item	Total	
	Low	High
<b>DIRECT SECTION 7 COSTS</b>		
<b>Conservation Programs</b>	\$15,600	\$15,600
<b>Farming and Ranching Operations</b>		
Farm Loan Programs, Consultations	\$23,000	\$34,500
Farm Loan Programs, PMs	Minor	Minor
USDA Conservation Programs	\$92,000	\$161,000
<b>Mining and Quarrying Operations</b>		
Consultations	\$22,000	\$22,000
PMs (Does not include ripple effects)	\$8,700,000	\$10,800,000
<b>Navigational Aids</b>	None	None
<b>Religious Establishments and Cemeteries</b>		
Existing Religious Establishments and Cemeteries	None	None
New Religious Buildings	None	None
<b>Power Lines</b>	None	None
<b>Water Systems</b>		
Existing Irrigation Systems	None	None
New Irrigation Improvements	None	None
Existing Potable Water Systems	None	None
New Potable Water Improvements	None	None
<b>Roads</b>		
Existing Roads	None	None
Construction of New Roads, Consultation	\$79,400	\$79,400
Construction of New Roads, PMs	\$3,950,000	\$6,400,000
<b>Development</b>		
Resort/Residential Development, Consultations	\$26,100	\$39,300
Resort/Residential Development, PMs	\$42,900,000	\$43,200,000
<b>Golf Courses and Parks</b>		
Existing Golf Courses and Parks	None	None
Planned Golf Courses and Parks, Consultations	\$22,000	\$22,000
Planned Golf Courses and Parks, PMs	\$217,800	\$594,000
<b>Residential Development</b>		
Existing Residential Homes, Consultations	\$43,200	\$50,400
Existing Residential Homes, PMs	\$4,900	\$11,900
Planned Residential Development, Consultations	\$22,000	\$22,000
Planned Residential Development, PMs	\$143,200	\$326,700
<b>Commercial Development</b>	None	None
<b>Industrial Development</b>		
Consultations	\$22,000	\$22,000
PMs	\$21,400	\$55,400



**Table VI-5. Section 7 Costs and Benefits Attributable to the  
Cave Animals Listing and Critical Habitat**  
(18-year estimates)  
(continued)

CH = critical habitat PMs = project modifications O&M = operation and maintenance Fed = Federal ne = not estimated

Item	Total	
	Low	High
<b>Wastewater Treatment</b>		
Consultations	\$22,000	\$44,000
PMs	\$27,400	\$99,000
<b>Injection Wells</b>		
Consultations	\$21,600	\$36,000
PMs	\$60,000	\$125,000
<b>Underground Storage Tanks</b>	None	None
<b>Ecotourism</b>	None	None
<b>Natural Disasters</b>		
Fed. Emergency Management Agency, Consultations	\$7,500	\$15,000
Federal Emergency Management Agency, PMs	Minor	Minor
Farm Service Agency Disaster Assistance, Consultations	\$7,500	\$15,000
Farm Service Agency Disaster Assistance, PMs	Minor	Minor
<b>Service Incidental Take Permits</b>		
Consultations	\$62,400	\$62,400
PMs	None	None
<b>INDIRECT COSTS*</b>		
<b>Islandwide Impacts</b>		
Expenditures and Sales: 2020		
Construction Related	\$4,666,000	\$12,900,000
Hotel, Resort/Residential, and Related Activities	\$93,317,000	\$258,004,000
Total	\$97,983,000	\$270,904,000
Employment: 2020		
Construction Related	\$263	\$763
Hotel, Resort/Residential, and Related Activities	\$1,069	\$2,957
Total	\$1,332	\$3,720
Total Loss in Income Benefits: 2003 to 2020	\$546,659,000	\$1,539,107,000

\* Although the analysis does provide general estimates of some of the potential indirect costs shown below, not all of the estimates are summarized in this table. Because some of these indirect costs are highly speculative, this table instead reports qualitatively on their likelihood and magnitude. For additional information on any of these indirect impacts, the reader should refer to the economic cost and benefit chapter of the analysis. Only those costs deemed more likely to occur are included in this summary table in order to present the most probable overall impact of critical habitat designation.

**Table VI-5. Section 7 Costs and Benefits Attributable to the  
Cave Animals Listing and Critical Habitat**

(18-year estimates)

(continued)

CH = critical habitat PMs = project modifications O&M = operation and maintenance Fed = Federal ne = not estimated

Item	Total	
	Low	High
<b>Costs and Delays for Successful Projects</b>		
Environmental Reviews	\$108,000	\$440,000
Litigation	Large	Large
<b>Residential, Commercial and Industrial Development</b>	Moderate	Moderate
<b>Agriculture</b>	Moderate	Moderate
<b>Underground Storage Tanks</b>	None	None
<b>Habitat Conservation Plans</b>	\$3,900,000	\$7,300,000
<b>Contesting Redistricting</b>	\$1,000,000	\$1,000,000
<b>Land Management for Conservation</b>	Large	Large
<b>State and County Environmental Review</b>	\$375,000	\$975,000
<b>Reduced Property Values</b>	\$36,000,000	\$72,000,000
<b>Condemnation of Property</b>	None	None
<b>Costs to Investigate Implications of CH</b>	\$225,000	\$526,000
<b>Loss of Conservation Projects</b>	None	None
<b>TOTAL COSTS</b>		
Direct	\$56,513,000	\$62,252,600
Indirect	\$686,251,332	\$1,892,255,720
Direct and Indirect	\$742,764,332	\$1,954,508,320
Discounted Present Value**	\$415,085,054	\$1,092,253,837
Annualized**	\$41,264,685	\$108,583,796
<b>BENEFITS</b>		
<b>Benefits of Species Preservation</b>	Significant	Significant
<b>Reduced Costs Due to Successful Preservation</b>	Large	Large
<b>Environmental Benefits and Other Benefits</b>		
Open Space, Maha'ulepu Coast	Significant	Significant
Other Open Spate	Significant	Significant
Soil and Chemical Runoff	Small	Small
Traffic Congestion	Large	Large
Native Plants	Significant	Significant
<b>Ecotourism</b>	Small	Small
<b>Economic Activity Generated by Conservation Management</b>	Possibly Large	Possibly Large
<b>Benefits to Developers</b>	Minor	Minor

\*\* Present value and annualized calculations are based on the OMB prescribed seven percent discount rate and the assumption that total costs are distributed evenly over the entire period of analysis.

## APPENDIX VI-A

### Information on the *Palila* Critical Habitat

In 1975, the Service listed the *palila* (*Psittirostra bailleui*), a Hawaiian honeycreeper (a bird), as an endangered species. The *palila* depends entirely on the *mamane-naio* ecosystem—a broad band of sparse forest encircling Mauna Kea between about 7,000 and 10,000 feet elevation. In 1977, in an effort to further protect the *palila*, the Service designated the *palila* critical habitat, encompassing about 67,000 acres (105 square miles) of State managed hunting land.

The *palila* were at risk because sheep and goats on Mauna Kea browsed on the *mamane* trees in the *mamane-naio* ecosystem, which was very destructive to the *palila*'s habitat. Starting in the late 1940s, the population of game mammals was allowed to increase on the mountain to allow sustained harvest by hunters. Even after the *palila* was listed as endangered and its critical habitat was designated, DLNR continued to manage the feral sheep and goat populations at sustainable levels for hunting, causing continued harm to the *palila*'s habitat.

This situation led the Sierra Club Legal Defense Fund to file a lawsuit in Federal court, *Palila v. Hawaii Department of Land and Natural Resources*, to require DLNR to remove the feral sheep and goats from Mauna Kea. The case tested the prohibition in the Act on *taking* of any endangered species of fish or wildlife, where *take* is defined as “to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or attempt to engage in any such conduct.” At issue was whether modifying a habitat (i.e., in this case sheep browsing on *mamane* trees) may result in “harm” to a species thereby meeting the definition of “*taking*.”

In 1979, a Federal court rendered an opinion in support of the plaintiff. Since studies showed clearly that the sheep and goats were “destroying or altering” the *palila* habitat, the court ordered DLNR to eradicate them from Mauna Kea and this was nearly achieved by 1981. The ruling did not affect the management of pigs on the mountain.

Following this case, the Service regulations defined “harm” to be “an act which actually kills or injures wildlife.” The regulations further explain that “[s]uch act may include significant modifications where it actually kills or injures wildlife by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering.”

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- County of Kaua'i, Office of Community Assistance, Housing Agency
- County of Kaua'i, Planning Department
- County of Kaua'i, Public Works Department
- Hawai'i Department of Agriculture
- Hawai'i Department of Health
- Hawai'i Department of Land and Natural Resources
- Hawai'i Department of Transportation
- Hawai'i Housing and Community Development Corporation
- Hawai'i Office of Environmental Quality Control
- Hawai'i State Preservation Division
- University of Hawai'i, Department of Geology and Geophysics
- U.S. Army Corps of Engineers
- U.S. Coast Guard
- U.S. Department of Agriculture, Natural Resources Conservation Services
- U.S. Department of Housing and Urban Development
- U.S. Fish and Wildlife Service, Pacific Islands Fish and Wildlife Office

Private

- Alexander & Baldwin, Inc.
- Belt Collins Hawai'i, Ltd.
- Beylik Drilling, Inc.
- CIRI Land Development
- Construction Consultants, Inc.
- Eric A. Knudsen Trust
- Glover Jas W. Ltd.
- Grace Pacific Corporation
- Grove Farm Co., Inc.
- H Eunice Nursery, Inc.

- Industrial Economics, Inc.
- Kaua'i Aggregates
- Kaua'i Coffee Company, Inc.
- Kaua'i Electric
- Kaua'i Hydroseed & Landscape
- Kaua'i Nature Tours
- Kaua'i Nursery & Landscaping, Inc.
- Kiahuna Golf Club
- Kobayashi Group, LLC
- Lehua Lena Nursery
- Milohae Limited Partnership
- No Ka Oi Plants
- Po'ipu Bay Golf Course
- Village Properties, Inc.
- Wilson Okamoto & Associates, Inc.

Non-Profit

- Bishop Museum
- Earthjustice Legal Defense Fund
- Hawai'i Agriculture Research Center
- Pacific Legal Foundation
- The Nature Conservancy of Hawai'i